



INTERNATIONAL CONFERENCE ON EMERGING TRENDS IN ENGINEERING AND TECHNOLOGY

ICET2025

14-15 November 2025
Pokhara Grande, Birauta

ABSTRACTS BOOK

Organized by:



Pokhara Engineering College

Pokhara, Phirke-08, Kaski, Nepal

Contact Details : 061-581209

info@pec.edu.np



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Edited By :

Er. Krishna Ghimire

Coordinator, Research Management Cell

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TABLE OF CONTENTS

S.N.	Content	Page No.
1.	About the Conference	1
2.	About the organizer	2
3.	Message from the Director	3
4.	Message from the Principal	4
5.	Message from the Research Management Cell	5
6.	Preface	6
7.	Conference Advisors Board	7
8.	Conference Steering Committee	7
9.	Conference Organizing Committee	8
10.	Conference Scientific Committee	9
11.	Table of Abstracts	11-15
12.	Table of Posters	16-17
13.	Conference Schedule	18-28
14.	Biography of Keynote Speakers	29-33
15.	Biography of Invited Speakers	34
16.	Abstracts- Keynote Speakers	36-51
17.	Abstracts- Invited Speakers	53-55
18.	Abstracts- Presenters in different themes	57-140
19.	Abstracts- Posters	142-178

About the Conference

Welcome to ICET 2025!

It is our great pleasure to welcome you to the **3rd International Conference on Emerging Trends in Engineering and Technology (ICET 2025)**, taking place on **14–15 November 2025** organized by **Pokhara Engineering College**, in the beautiful city of **Pokhara, Nepal**.

ICET 2025 aims to bring together leading academics, researchers, industry professionals, entrepreneurs, and policymakers from around the world to explore the latest innovations, research findings, and transformative trends shaping the future of engineering and technology. This year's conference theme, **“Emerging Trends in Engineering and Technology,”** sets the stage for stimulating discussions, cross-disciplinary collaboration, and knowledge exchange.

The conference will feature:

- **Keynote speeches** by globally renowned experts
- **Technical sessions** covering cutting-edge topics
- **Workshops** to enhance practical knowledge and skills
- **Networking opportunities** to foster academic and industry partnerships

ICET 2025 invites high-quality paper submissions presenting original research, case studies, and technological innovations that align with the theme. The conference strives to encourage collaboration, promote economic partnerships, facilitate technological transfer, and support institutional development in research and education.

With its breathtaking natural beauty, rich cultural heritage, and growing technological landscape, Pokhara offers an ideal setting for an engaging and memorable academic event.

We look forward to your participation and to an inspiring exchange of ideas that will help shape the future of engineering and technology.

See you in Pokhara!

About the Organizer

Pokhara Engineering College (PEC), established in 1999 and affiliated with Pokhara University, is a leading institution in Gandaki Province dedicated to excellence in engineering education, research, and innovation. Over the years, PEC has built a strong academic reputation by offering undergraduate and postgraduate programs in Civil Engineering, Computer Engineering, IT Engineering, and Architecture, along with Master's programs in Construction Management.

With its vision of fostering global academic collaboration and advancing research in multidisciplinary fields of engineering and technology, PEC has taken the initiative to organize international conferences that serve as vibrant platforms for knowledge exchange and innovation. The **International Conference on Emerging Trends in Engineering and Technology (ICET 2025)** is the first of its kind hosted by PEC, reflecting the college's commitment to bringing together academicians, researchers, industry professionals, entrepreneurs, and policymakers from around the world. As a conference organizer, PEC ensures a dynamic and professional environment where participants can engage in keynote speeches by global experts, technical sessions on cutting-edge topics, interactive workshops, and networking opportunities. With its state-of-the-art infrastructure, experienced faculty, and strong research culture, PEC is well-positioned to manage high-level academic events that contribute to global discourse in engineering and technology.

Situated in the beautiful city of Pokhara, surrounded by the majestic Himalayas and serene lakes, PEC offers not only an academic experience but also a unique cultural and natural environment for international delegates. By organizing international conferences, the college aims to strengthen research collaborations, promote innovation, and contribute to the academic and technological advancement of Nepal and the global community.

Message from Director

Pokhara Engineering College, a premier academic institution situated in the beautiful city of Pokhara—renowned for its scenic landscapes and rich cultural heritage—stands as a beacon of innovation and excellence in engineering education. The college is committed to fostering a learning environment where education transcends the boundaries of classrooms and textbooks, promoting holistic development and practical application of knowledge.



We believe that this conference will open doors to meaningful collaborations, bridging the gap between theory and practice. This is the third international conference organized by Pokhara Engineering College. The International Conference on Emerging Trends in Engineering and Technology is a premier academic and professional event that provides a global platform for researchers, academicians, industry leaders, entrepreneurs, and students to exchange ideas, share innovations, and present research findings in the rapidly evolving fields of engineering and technology. The conference aims to foster innovation and inspire young entrepreneurs to transform their ideas into impactful solutions. By bringing together diverse voices and perspectives, it seeks to shape the future of engineering and technology through knowledge sharing and collaborative engagement.

On behalf of Pokhara Engineering College, I extend my heartfelt welcome to all our esteemed guests, keynote speakers, national and international participants, faculty members, staff, and students. Your active participation and dedication in joining us greatly enrich this conference, adding immense value through your meaningful engagement and contributions.

Mr. Amber Gurung

Director

Message from The Principal

It is with great pride and pleasure that I extend my warmest greetings to all participants of the International Conference on Emerging Trends in Engineering and Technology (ICET 2025), organized by Pokhara Engineering College (PEC). Since its establishment in 1999, PEC has been committed to nurturing academic excellence, advancing research, and promoting innovation in Gandaki Province and beyond.



In recognition of the growing importance of global collaboration in education and research, ICET 2025 has been envisioned as a vibrant platform where scientists, academicians, researchers, and students can share their knowledge, exchange ideas, and explore emerging trends across diverse fields of engineering and technology.

I am confident that the deliberations and interactions during this conference will inspire new perspectives, foster meaningful collaborations, and open pathways for impactful research in the years to come.

On behalf of PEC, I sincerely thank our distinguished keynote and invited speakers, paper presenters, members of the scientific and organizing committees, and all participants for their invaluable contributions to making this conference a success.

I wish ICET 2025 great success and look forward to fruitful discussions that will strengthen academic partnerships and contribute to engineering excellence globally.

Er. Som Gurung

Principal

Message from the Research Management Cell

The Research Management Cell (RMC) of Pokhara Engineering College has always been committed to nurturing a culture of research, innovation, and academic excellence. In today's rapidly advancing world of science and technology, it is essential for institutions to create platforms where ideas can be shared, debated, and transformed into impactful solutions.



The International Conference on Emerging Trends in Engineering and Technology (ICET 2025) represents a significant milestone in this endeavor. By bringing together researchers, academicians, professionals, and students from diverse disciplines, this conference provides an excellent opportunity to exchange knowledge, explore emerging trends, and foster collaborations that extend beyond geographical boundaries. The RMC firmly believes that such initiatives will not only strengthen the research activities of Pokhara Engineering College but will also contribute to the broader academic and technological development of Nepal and the global community.

We extend our heartfelt gratitude to all national and international guest, keynote speakers, invited speakers, presenters, participants and the whole college family for their valuable contributions and active involvement. We are confident that ICET 2025 will inspire new ideas, encourage innovation, and lay the foundation for future collaborations with all stakeholders.

Er. Krishna Ghimire

Coordinator

Research Management Cell (RMC)

Preface

This abstract book compiles all the abstracts of the papers presented at the 1st International Conference on Emerging Trends in Engineering and Technology (ICET 2025), organized by Pokhara Engineering College on 14–15 November 2025. A total of 57 papers and 22 posters were presented by researchers and professionals from eight different countries—America, Australia, India, Japan, Malaysia, Norway, Nepal and United Kingdom. The conference was structured into six thematic sessions: Civil Infrastructure Engineering, Digital Technology and Artificial Intelligence, Disaster Risk Engineering and Management, Global Emerging Trends in ICT, Material Engineering, and Sustainable and Inclusive Architecture.

Pokhara Engineering College (PEC), established in 1999, is a pioneering technical institution in Gandaki Province. Recognizing the importance of academic excellence and the power of global collaboration, PEC has taken the initiative to organize ICET 2025.

The conference aims to bring together distinguished academics, researchers, industry professionals, entrepreneurs, and policymakers from across the globe to explore the latest innovations, research findings, and transformative trends shaping the future of engineering and technology. This conference provides a platform for insightful discussions, cross-disciplinary collaboration, and meaningful knowledge exchange. ICET 2025 welcomes high-quality research papers, case studies, and technological innovations aligned with its theme. The conference strives to foster collaboration, promote economic partnerships, facilitate technology transfer, and support institutional development in research and education.

We extend our sincere gratitude to all the participants, as well as the advisory, organizing, and scientific committees, whose dedication and support have made this conference a success.

Conference Advisors ICET 2025

Prof. Dr. Indra Prasad Tiwari

Chancellor, Gandaki University, Nepal

Dr. Krishna Chandra Devkota

Vice Chairman, Policy and Planning Commission,
Gandaki Province

Prof. Dr. Bed Bahadur K.C.

Vice Chancellor, Pokhara University, Nepal

Assoc. Prof. Dr. Ajay Thapa

Registrar, Pokhara University, Nepal

Assoc. Prof. Buddhi Raj Joshi

Dean, Faculty of Science and Technology,
Pokhara University, Nepal

Conference Steering Committee, ICET 2025

Ms. Hira Gurung

Mr. Amber Gurung

Dr. Sailesh Gurung

Conference Organising Committee ICET 2025

Er. Som Gurung

(Co-ordinator)

Assist. Prof. Pokhara Engineering College

Er. Krishna Ghimire

(Sub Co-ordinator)

Assist. Prof. Pokhara Engineering College

Members:

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Assist. Prof. Pokhara Engineering College

Er. Bikash Baral

Assist. Prof. Pokhara Engineering College

Er. Suraj Basant Tulachan

Assist. Prof. Pokhara Engineering College

Er. Bimal Bhandari

Assist. Prof. Pokhara Engineering College

Ar. Roshani Subedi

Assist. Prof. Pokhara Engineering College

Scientific Committee, ICET 2025

Prof. Dr. Subarna Shakya

Institute of Engineering, T.U

Prof. Dr. Sudan Jha

Kathmandu University, Nepal

Prof. Dr. Rajendra Prasad Adhikari

President, NEPCA

Prof. Dr. Tek Raj Gyawali

Pokhara University, Nepal

Prof. Dr. Govind Prasad Lamichhane

Pokhara University, Nepal

Prof. Dr. Binaya Kumar Mishra

Pokhara University, Nepal

Prof. Dr. Madhav Prasad Koirala

Pokhara University, Nepal

Prof. Dr. Min Pun

Prithivi Narayan Campus, T.U

Prof. Dr. Hom Bahadur Rijal

Kyoto University

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Assoc. Prof. MIT-ADT University, India

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IIT, Mandi, India

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Pokhara University, Nepal

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Pokhara University, Nepal

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Pokhara University, Nepal

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Assist. Prof. Er. Som Gurung

Pokhara Engineering College, Nepal

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Pokhara University, Nepal

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Pokhara University, Nepal

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University of Western Australia

Assist. Prof. Er. Krishna Ghimire

Pokhara Engineering College, Nepal

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Institute of Engineering, T.U

Assist. Prof. Dr. Durga Bastakoti

Institute of Engineering, T.U

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University of Oklahoma, USA

Assist. Prof. Dr. Prakash Devkota

Affiliated to Pokhara University

Assist. Prof. Er. Bikash Baral

Pokhara Engineering College, Nepal

Assist. Prof. Dr. Shital Babu Acharya

K. Ito Architects & Engineers Inc., Australia

Assist. Prof. Dr. Bidur Devkota

Researcher, Devorak Innovation

ICET 2025

Table of Abstracts

S.N.	Content	Page No.
1	Adoption of Cloud Computing in Government	36
2	Engineering the Future: AI, IoT, and Secure Systems for Sustainable and Resilient Infrastructure	38
3	From Challenge to Breakthrough: A Step-by-Step Journey in High Ductile Mortar (HDM) Development	40
4	Governance in Physical Infrastructure Delivery: Need for Legal, Institutional and Technical Integration	42
5	Advancing Urban Flood Resilience with Integrated Hydrologic–Hydraulic Models and Green Stormwater Infrastructure	44
6	Thermal Adaptation of Buildings and People for Energy Saving in Nepal	46
7	Advance analysis of the intense-deformed condition of crossing sectors of thin shells with method of super element method	47
8	Hybrid Deep Learning-Based Security Model for Robust Intrusion Detection in IoT Networks	49
9	Parameter estimation of a two state delay differential equation modeling the human respiratory system	51
10	Architecture of Belonging: Reimagining Schools from Classrooms to Community	53
11	Advancing the Design of High-Strength Steel Welded Connections: A Numerical Approach with Plastic Strain Limits	55
12	Improving trust in tunneling ML models with XAI: shap-based explainability	57
13	Architectural Insights from Urban Public Open Space Use Behavior: A Case of Basundhara Park, Pokhara	58

14	Document Summarization Using Convolution Neural Networks	60
15	Development of a Streamlit-Based Deep Learning Tool for Instant Soil Classification from Borehole Grain Size Data	61
16	A Synthesis of Online Travel Reviews, Sentiment Models, and Computational Methods for Tourism Research in Nepal	63
17	Serviceability of Water Supply Projects of Madi Rural Municipality: A case study on Yangjakot Water Supply Project	65
18	Water Treatment Efficiency Evaluation of Treatment Plant - A Case Study of Bhadgaun Water Supply Project	67
19	Performance Assessment of Road construction Projects in Gandaki Province using Earned Value Analysis	69
20	Analysis of Construction Projects Across Countries: Developed and Developing Countries	70
21	Assessment of Road Pavement Condition using Pavement Condition Index (PCI) method in Parbat District	72
22	Strengthening Disaster Risk Reduction in Nepal: From Policy to Practice	73
23	A Comparative Study of Road Projects Completed by Users Committee and Contractor Based approach in Gandaki Rural Municipality, Gorkha	75
24	Analyzing the gap between IT curriculum and industry demand in nepal using NLP	77
25	AI and the Future of Healthcare in Nepal: Opportunities, Challenges, and Risk Management Strategies.	79
26	Study on Quality of Concrete by Using Blended Aggregates of Pame and Seti River Basins	81

27	Seismic Vulnerability Assessment of Plan Irregularity Reinforced Concrete Framed Building	83
28	Assessment of Time and Cost Overrun of Province Level Construction Project in Tanahun, Gandaki Province, Nepal	85
29	Divine Echoes: Evaluating the Spiritual Sustainability of Tal Barahi Temple through its Built Environment.	87
30	The Application of Artificial Intelligence (AI) in Architectural Conceptual Design: A Critical Review	89
31	Post-Construction Performance Monitoring and Maintenance of Community-Based Micro Hydropower Projects	91
32	Abstractive Summarization of News Articles Using BART	93
33	Leveraging AI and IoT for Transformative Quality Education 4.0: Opportunities and Challenges in Engineering Departments of Pashchimanchal Campus, Pokhara	95
34	Experimental Study of Behaviour of M20 Concrete by addition of Bamboo Fiber	97
35	Adaptive Housing Across the Lifespan: A Systematic Review	99
36	Design of a Hardware-Integrated OCR System for Devnagari Text in Nepalese Citizenships	101
37	Impact of On-the-Job Training of Village Maintenance Workers on Functionality of Water Supply Projects	103
38	Effect of Post Earthquake rural housing reconstruction on housing types and family debt	105
39	Building Typologies in a Vernacular Street of Dhampus, Nepal	107
40	2D Numerical Simulation of Sediment Flushing in Hydropower Simulation	108

41	An economic analysis of grid tied solar hybrid power system compared to grid tied diesel hybrid power system at School of Engineering, Block B, Pokhara University	110
42	Influences of the natural environment on the traditional settlement pattern: A study on the growth of Tangting Village, Nepal	112
43	A Mobile Application to track Public Vehicle and suggest passengers Vehicle to reach their destination in Pokhara Metropolitan City	114
44	A study on Soil-Cement Bricks with addition of Thatch	115
45	Selection of CMIP6 climate models and future climatic projection in Gandaki River basin, Nepal	116
46	Geological Mapping, Geohazard Assessment, and Construction Material Survey around Prithvi Narayan Campus, Pokhara, Nepal	118
47	Seismic Resilience in the Himalayas: Vernacular Timber–Stone Construction of Tsum Valley, Nepal	120
48	Comparative Study of Behaviour of Buildings using NBC 105:2020 and IS 1893:2016 based on Horizontal Irregularities	122
49	Emotion Aware System: CNN Based Facial Expression Recognition	124
50	Multi-Stakeholder perspective on Internship in architectural education: A Case of Chitwan Engineering Campus	125
51	Assessment of Supply Chain of A-Class Construction Materials of Public Building Construction Project in Lamjung District	127
52	Analysis of the Impact of Goat Hair as Fiber on the Compressive and Flexural Strength of M-20 Concrete	129

53	Towards Explainable AI in Healthcare: Machine Learning Based Diabetes Prediction with LIME	131
54	An Experimental Study on the Discrepancies in Mechanical Properties of Concrete Between Laboratory Mixes and In-situ Cast Specimens	133
55	Shift towards Eco-friendly and High-Performance Chemical Admixture in concrete: A case study of Nepal.	135
56	Enhanced efficiency in dual-stage grid-connected photovoltaic systems with PSO-integrated hybrid MPPT techniques	137
57	Performance Assessment Using Key Performance Indicators for Shivalaya Water Supply Project	139

Table of Posters

S.N.	Content	Page No.
1	“Women Wellness Center”: A healing environment for women	142
2	The Pawtral: Architecture for Canine Rehabilitation Center	143
3	Preservation of Linguistic Heritage: Museum of Language and Script	145
4	The Natak Spectrum: A Hub for All Dramatic Expressions	147
5	Women’s Hospital (Healing hearts,Growing families)	149
6	Social Development Center at Aandhikhola	151
7	Gandaki Province Assembly Building an Architectural Reflection of Democracy	153
8	Community Multi-sport Complex in Kawasoti	154
9	Pastoral Retreat: A Village of Sheep & Shepherds	155
10	Healing and Rebuilding Lives “Midway Shelter for Women Survivors of Violence at Kopila Nepal”	157
11	Early Stage Diabetes Treatment Centre: Merging Nature, Space and Care	159
12	Life Beyond Bars (A glimpse of liberty for incarcerated persons)	161
13	Living Small, Dreaming Big: Reimagining Urban Living for the Next Generation	163
14	Waste Recycle Center	165
15	Shanti-ban Osho Meditation Center	167
16	Empowerment Center for rainbow Community	169
17	Skill and Enterprise Development Centre: A promotion Hub for Small Scale Industries	171
18	Multigenerational Village (A bond between orphan and elderly in a shared living environment)	173

19	A Multi- Sensory Museum for Endangered Species of Nepal	174
20	Pokhara School of Arts: A Comprehensive Art School	175
21	Legacy of the Civil War: A Memorial for Nepal's Transformation	176
22	Naturopathy Centre	178

International Conference on Emerging Trends in Engineering and Technology (ICET 2025)

Date: 14th and 15th November, 2025 (8:00 AM-5 PM)

Venue: Pokhara Grande, Biraura, Pokhara-17, Kaski, Nepal

Organizer: Pokhara Engineering College (PEC)

Conference Themes:

- Civil Infrastructure Engineering
- Material Engineering
- Sustainable and Inclusive Architecture
- Global Emerging Trend in ICT
- Digital Technology and Artificial Intelligence
- Disaster Risk Engineering and Management

Conference Schedule

Day-1: Friday, 14th November, 2025

Session- First

Manaslu Hall

7:00A.M-8:30 AM- Registration/Breakfast

8:30A.M-10:00 AM- Welcome speech and Inauguration

Key Note Speaker

10:00 AM-10: 30AM

Prof. Dr. Subarna Shakya, Professor, Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, Tribhuvan University, Nepal

“Adoption of Cloud Computing in Government”

10:30 AM-11: 00 AM

Prof. Dr. Tek Raj Gyawali, Professor, School of Engineering, Pokhara University, Lalitpur, Nepal

“From Challenge to Breakthrough: A Step-by-Step Journey in High Ductile Mortar (HDM) Development”

11:00 AM-11: 30 AM

Prof. Dr. Sudan Jha, Professor, Department of Civil Engineering, Kathmandu University, Nepal

“Engineering the Future: AI, IoT, and Secure Systems for Sustainable and Resilient Infrastructure”

11:30 AM-12: 00 PM

Prof. Dr. Binaya Kumar Mishra, Professor, School of Engineering, Pokhara University, Nepal

“Advancing Urban Flood Resilience with Integrated Hydrologic–Hydraulic Models and Green Stormwater Infrastructure”

12:00 AM-12: 30 PM

Assoc. Prof. Dr. Ram Kumar Solanki, Associate Professor and Chief Coordinator, Office for International Affairs, School of Computing, MIT Art, Design and Technology, Pune, India

“Hybrid Deep Learning-Based Security Model for Robust Intrusion Detection in IoT Networks”

12:30 PM -12:45 PM- Chief Guest Speech

12:45 PM -1:00 PM- Closing Remarks of Inauguration Ceremony

1:00 PM- 1:45 PM -Lunch at **Makalu Hall**

Session- Second

Annapurna Hall

1:45 PM-3:00 PM Technical/Parallel Session

(Session Chair: Assoc. Prof. Dr. Deepanjal Shrestha)

1. AI and the Future of Healthcare in Nepal: Opportunities, Challenges, and Risk Management Strategies.
Hari Krishna Neupane¹
2. Analyzing The Gap Between It Curriculum and Industry Demand in Nepal Using NLP
Hari Prasad Baral¹, Bhoj Raj Ghimire²
3. Leveraging AI and IoT for Transformative Quality Education 4.0: Opportunities and Challenges in Engineering Departments of Pashchimanchal Campus, Pokhara
Nabin Lamichhane¹, Bhoj Raj Ghimire², Deepanjal Shrestha³, Bhuvan Unhelkar⁴, Deepak Prashar⁵
4. Towards Explainable AI in Healthcare: Machine Learning Based Diabetes Prediction with LIME
Tara Bahadur Thapa
5. Enhanced efficiency in dual-stage grid-connected photovoltaic systems with PSO-integrated hybrid MPPT techniques
Yam Krishna Poudel¹, Prof. Dr. Rajiv Kumar²
6. A Synthesis of Online Travel Reviews, Sentiment Models, and Computational Methods for Tourism Research in Nepal
Ashish Adhikari¹, Bidur Devkota²
7. Emotion Aware System: CNN Based Facial Expression Recognition
Sujan Dhakal¹
(Technical Coordinator: Er. Anuj Sherchan and Er. Shiva Kunwar)

Manaslu Hall

1:45 PM-3:00 PM Technical/Parallel Session

(Session Chair: Assist. Prof. Dr. Om Prakash Giri)

1. Analysis of Construction Projects Across Countries: Developed versus Developing Countries

Bikash Baral¹, Janani Selvam², Sateesh Kumar Ojha³

2. 2D Numerical Simulation of Sediment Flushing in Hydropower Simulation

Sabin Bhandari¹

3. Impact of On-the-Job Training of Village Maintenance Workers on Functionality of Water Supply Projects

Pratik Gurung¹, Arjun Gautam²

4. Assessment of Time and Cost Overrun of Province Level Construction Project in Tanahun, Gandaki Province, Nepal

Homnath Gautam¹, Som Gurung², Krishna Ghimire³

5. Post-Construction Performance Monitoring and Maintenance of Community-Based Micro Hydropower Projects

Mishra Kumar Chaudhary¹, Niroj K.C.²

6. Performance Assessment Using Key Performance Indicators for Shivalaya Water Supply Project

Yuvraj Poudel¹, Som Gurung²

3:00 PM-3:30 PM- Poster Presentation

(Session Coordinator: Er. Krishna Ghimire)

Session-Third

Manaslu Hall

3:30PM-4:45 PM- Technical/Parallel Session

(Session Chair: Assoc. Prof. Dr. Rajib Pokhrel)

1. Strengthening Disaster Risk Reduction in Nepal: From Policy to Practice
Bishnu Prasad Gotame¹
2. An Experimental Study on the Discrepancies in Mechanical Properties of Concrete Between Laboratory Mixes In-situ Case Specimens
Yam Bahadur Thapa¹, Bishnu Bahadur Thapa², Sagar Shrestha³
3. Geological Mapping, Geohazard Assessment, and Construction Material Survey around Prithvi Narayan Campus, Pokhara, Nepal
Sarasoti Poudel¹, Safalta Timilsina
4. A study on Soil-Cement Bricks with addition of Thatch
Sanjaya Lamichhane¹
5. Shift towards Eco-friendly and High-Performance Chemical Admixture in Concrete: A Case Study of Nepal
Yam Bahadur Thapa¹, Sagar Shrestha²
6. Experimental Study of Behaviour of M20 Concrete by additional of Bamboo Fiber
Narendra Basyal¹, Bimal Bhandari²
7. Analysis of the Impact of Goat Hair as Fiber on the Compressive and Flexural Strength of M-20 Concrete
Surya Prasad Parajuli¹, Bimal Bhandari²

(Session Coordinator: Er. Bimal Bhandari)

Annapurna Hall

3:30 PM-4:45 PM- Technical/Parallel Session

(Session Chair: Assist Prof. Ar. Sujata Shakya Bajracharya)

1. Multi-Stakeholder perspective on Internship in architectural education: A Case of Chitwan Engineering Campus
Suraj Shahi¹
2. Seismic Resilience in the Himalayas: Vernacular Timber–Stone Construction of Tsum Valley, Nepal
Sonam Lama¹
3. Influences of the natural environment on the traditional settlement pattern: A study on the growth of Tangting Village, Nepal
Samikshya Kandel¹, Luna Thapa²
4. Building Typologies in a Vernacular Street of Dhampus, Nepal
Roshani Subedi¹, Arati Bhandari²
5. Designing for the Body: Adaptive Housing Across the Lifespan
Pragati Baniya¹
6. Architectural Insights from Urban Public Open Space Use Behavior: A Case of Basundhara Park, Pokhara
Ananta Gautam¹
7. Divine Echoes: Evaluating the Spiritual Sustainability of Tal Barahi Temple through its Built Environment.
Kedar Chhetri¹
8. The Application of Artificial Intelligence (AI) in Architectural Conceptual Design: A Critical Review
Luna Thapa¹, Samikshya Kandel², Chhanya Nidal³, Rekha Lamichhane Wagle⁴

(Session Coordinator: Ar. Roshani Subedi and Ar. Ananta Gautam)

4:45- 5:00 PM - Summary

5:00 PM- Hi- Tea/ End of the Day

Day-2: Saturday, 15th November, 2025

Session- First

Manaslu Hall

7:00 AM - 9:00 AM Registration/Breakfast

Key Note Speaker

9:00 AM - 9: 20AM

Prof. Dr. Govinda Prasad Lamichhane, Professor, Department of Civil Engineering, School of Engineering, Pokhara University, Nepal

“Advance analysis of the intense-deformed condition of crossing sectors of thin shells with method of super element method”

9:20 AM - 9: 40AM

Prof. Dr. Rajendra Prasad Adhikari, Chairman, NEPCA

"Governance in Physical Infrastructure Delivery: Need for Legal, Institutional and Technical Integration"

9:40 AM - 10:00AM

Prof. Dr. Hom Bahadur Rijal, Graduate School of Environmental and Information Studies, Tokyo City University

“Thermal Adaptation of Buildings and People for Energy Saving in Nepal”

10:00 AM - 10:20 AM

Assist. Prof. Dr. Nirjal Sapkota and Dr. Janos Tori

"Parameter estimation of a two state delay differential equation modeling the human respiratory system"

Invited Speaker

10:20 AM - 10: 40AM

Dr. Shital Babu Acharya, Architecture and Planner, Australia

“Architecture of Belonging: Reimagining Schools from Classrooms to Community”

10:40 A.M - 11: 00A.M

Dr. Abhishek Ghimire, Research Associate, University of Western Australia

“Advancing the Design of High-Strength Steel Welded Connections: A Numerical Approach with Plastic Strain Limits”

11: 00 AM - 11:15 AM -Break

Session- Second

Annapurna Hall

11:15 PM - 12:30 PM- Technical/Parallel Session

(Session Chair: Assoc. Prof. Dr. Madhusudhan Kayastha)

1. A Mobile Application to track Public Vehicle and suggest passengers Vehicle to reach their destination in Pokhara Metropolitan City
Sandesh Joshi¹, Niraj Khadka²
2. An economic analysis of grid tied solar hybrid power system compared to grid tied diesel hybrid power system at School of Engineering, Block B, Pokhara University
Sadikshya Khanal¹
3. Design of a Hardware-Integrated OCR System for Devnagari Text in Nepalese Citizenships
Prashant Subedi¹, Sandesh Bashyal¹, Pragati Basnet¹, Amrit

Giri¹, Suraj Basant Tulachan², Smita Adhikari³

4. Abstractive Summarization of News Articles Using BART
Mohan Bikram KC¹, Ayush Sharma Kaudinya¹, Pramish Adhikari¹,
Smita Adhikari²
5. Document Summarization Using Convolution Neural Networks
Anuj Sherchan¹
(Session Coordinator: Er. Suraj Basant Tulachan)

Manaslu Hall

11:15 PM-12:30 PM- Technical/Parallel Session

(Session Chair: Prof. Dr. Govinda Prasad Lamichhane)

(Session Co-Chair: Assist. Prof. Er. Krishna Ghimire)

1. Assessment of Supply Chain of A-Class Construction Materials of Public Building Construction Project in Lamjung District
Suresh Gautam¹, Som Gurung²
2. Effect of Post Earthquake rural housing reconstruction on housing types and family debt.
Rajesh Sunuwar¹, Govinda Prasad Lamichhane²
3. Development of a Streamlit-Based Deep Learning Tool for Instant Soil Classification from Borehole Grain Size Data
Anuragi Thapa¹, Dipesh Kumar Shrestha¹, Deepak Thapa²
4. Assessment of Road Pavement Condition using Pavement Condition Index (PCI) method in Parbat District
Bimal Pun¹
5. A Comparative Study of Road Projects Completed by Users Committee and Contractor Based approach in Gandaki Rural Municipality, Gorkha
Dilip Khand¹, Krishna Ghimire²
6. Water Treatment Efficiency Evaluation of Treatment Plant - A Case Study of Bhadgaun Water Supply Project
Bijaya Chuwai¹, Rajib Pokhrel²

(Session Coordinator: Er. Yam Bahadur Thapa)

12:30 PM-1:30 PM- Lunch

Session- Third

Annapurna Hall

1:30 PM-2:45 PM- Technical/Parallel Session

(Session Chair: Assoc. Prof. Dr. Rajib Pokhrel)

1. Study on Quality of Concrete by Using Blended Aggregates of Pame and Seti River Basins Kanchan Jung Karki¹, Krishna Ghimire²
2. Development of a Streamlit-Based Deep Learning Tool for Instant Soil Classification from Borehole Grain Size Data Anuragi Thapa¹, Dipesh Kumar Shrestha¹, Deepak Thapa²
3. Performance Assessment of Road construction Projects in Gandaki Province using Earned Value Analysis Bijaya Subedi¹, Som Gurung²
4. Serviceability of Water Supply Projects of Madi Rural Municipality: A case study on Yangjakot Water Supply Project Bigyan Shrestha¹, Arjun Gautam²
5. Performance Assessment of Road construction Projects in Gandaki Province using Earned Value Analysis Bijaya Subedi¹, Som Gurung²
6. Comparative Study of Behaviour of Buildings using NBC 105:2020 and IS 1893:2016 based on Horizontal Irregularities Suchana Rijal¹, Pujan Tharu², Sanskar Shrestha³, Saurav Poudel⁴, Krishna Ghimire⁵
7. Seismic Vulnerability Assessment of Diploma Building Block B Krisha Khadka¹, Himal Gurung², Praju Pasin Thakali³, Puja Roka Magar, Yam Bahadur Thapa⁵

(Session Coordinator: Er. Krishna Ghimire, Er. Prabin Kumar Shrestha)

2:45PM-3:30PM- Poster Presentation

Session- Final

Annapurna Hall

3:30 PM- 4:00 PM – Keynote Speaker

4:00 PM-4:30 PM- Valedictory Session/ Certificate Distribution

4:30 PM onwards - Closing Remarks/ Vote of Thanks

5: 00 PM- End of the program

Biography of Key Note Speaker

Prof. Dr. Subarna Shakya

Institute of Engineering, T.U



Prof. Dr. Subarna Shakya is professor in Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, TU. Professor is awarded and admired as one of the 100 most dedicated professor by World Education Congress in 4th July 2019. Prof. Dr. Subarna Shakya is Visiting Professor at Brown University, USA and steering committee member of School on Internet (SOI), Kio University, Japan. He was Asst. Dean (Academic Administration), at Institute of Engineering, TU. Prof Dr. Subarna Shakya is involved as Director in Information Technology Innovation Center, TU, Executive Director (Gazetted Special Class) at National Information Technology Center, Government of Nepal, Project Director in Government Integrated Data Center Project, KOICA and Government of Nepal, Project Director, ICT development Project, ADB and Office of the Prime Minister and Council of Ministers. He is also involved as Member Secretary, ICT development project steering committee, Office of the Prime Minister and Council of Ministers, Government of Nepal, Member Secretary, Information Technology Development Committee, Government of Nepal, Director, Centre for Information Technology, IOE, TU.

Prof. Dr. Tek Raj Gyawali

Pokhara University, Nepal



Prof. Dr. Tek Raj Gyawali is a highly respected professor at Pokhara University, Nepal, specializing in material engineering within the field of civil engineering. With an outstanding career dedicated to research and education, Prof. Gyawali has made significant contributions to the development, testing, and application of innovative construction materials. His work focuses on improving the strength, durability, and sustainability of materials used in infrastructure, with particular attention to earthquake-resistant construction. Prof. Gyawali is recognized for bridging advanced material science with practical civil engineering solutions, fostering resilient and sustainable infrastructure. His keynote address promises to offer valuable insights drawn from years of research, field experience, and academic leadership.

Prof. Dr. Rajendra Prasad Adhikari

(Infrastructure, Public Procurement, Contract Management & Dispute Resolution Expert and Chairperson of Nepal Council of Arbitration, NEPCA)



Prof. Rajendra Prasad Adhikari is a distinguished Nepali academic and consultant with extensive expertise in procurement processes, contract administration, and the resolution of construction disputes. He has served as the Chairperson of the Advanced Research & Training Institute (ARTIst) for over a decade. In addition to his academic and research leadership, he provides independent consulting services in procurement, contract management, and dispute resolution. As a Chairman of the Nepal Engineering Procurement and Consultants' Association (NEPCA), Prof. Adhikari actively promotes professional excellence and capacity building within the engineering consultancy sector in Nepal. His research spans public procurement, construction project management, and infrastructure governance, with notable contributions to water management studies and construction disputes resolutions.

Prof. Dr. Sudan Jha

Kathmandu University, Nepal



Prof. Sudan Jha is a Senior Member of IEEE and a Professor in the Department of Computer Science & Engineering at Kathmandu University, Nepal. He leads the IoT R&D Lab at Kathmandu University and has previously been affiliated with KIIT University, Chandigarh University, Christ University, and more. He has held key positions such as Technical Director at Nepal Television, Principal in engineering colleges, and Individual Consultant at Nepal Telecom Authority. Prof. Jha is dedicated to advancing higher education and smart platform technologies, he has published 95+ SCI/SCIE-indexed research papers and book chapters in international peer-reviewed journals and conferences. He is a Co-Editor-in-Chief of an international journal and a Guest Editor for SCIE/ESCI/SCOPUS-indexed journals. Prof. Jha has delivered keynote speeches at over 45 international conferences and has conducted faculty development programs, short-term training programs, and workshops at both national and international levels. He holds certifications in Microservices Architecture, Data Science, and Foundations of Artificial Intelligence. His primary research interests include AI & IoT integration, Quality of Services in IoT-enabled devices, Neutrosophic Theory, and Neutrosophic Soft Set Systems.

Prof. Dr. Govind Prasad Lamichhane

Pokhara University, Nepal



Prof. Dr. Govind Prasad Lamichhane is Professor at Pokhara University, Nepal, specializing in analysis and design of thin shell structure in the field of structural engineering. With an outstanding carrier for research in constructive mode. During his academic carrier Prof. Govind Prasad Lamichhane always happy to motivate students to study and write innovative papers which are really applicable in field of structural engineering. He is the designer of Nepal's first Y shaped suspension bridge located in Ridi, Gulmi, Nepal. Besides teaching he really served nation and continue serving with designing enormous structural monument of thin shell structure, Gumba and bridges of various types. His keynote will address for analysis and design drift-allow type thin shell structures, modern type of prestress bridges, monuments in space and planets.

Prof. Dr. Binaya Kumar Mishra

Pokhara University, Nepal



Prof. Binaya Kumar Mishra has been serving as a full professor at the School of Engineering, Pokhara University, Nepal since 2018. He is a distinguished academic involved in both research and teaching at the undergraduate (Civil Engineering) and postgraduate (Hydropower Engineering; Public Health and Disaster Engineering) levels. Prior to his tenure at Pokhara University, he held faculty and research positions at various academic institutions in Japan and Nepal. Prof. Mishra's research interests encompass water resources management, climate and ecosystem change adaptation, hydrologic and environmental modeling, and the application of GIS and remote sensing. His scholarly work has been widely published in books and peer-reviewed journals, reflecting his significant contributions to the field.

Prof. Dr. Hom Bahadur Rijal

Tokyo City University, Japan



Dr. Hom Bahadur Rijal is a Professor of Architectural Engineering at Tokyo City University, Japan, holding both MEng and PhD degrees from Kyoto University. His research expertise lies in adaptive thermal comfort, occupant behavior, thermal environment, energy efficiency, and vernacular architecture. Dr. Rijal has conducted extensive field studies across climatic zones—especially in Nepal—investigating thermal comfort in traditional houses, schools, temporary shelters, and disaster-affected buildings. He served as a researcher at Oxford Brookes University, where he developed algorithms for window-opening behavior to predict indoor comfort and energy use. Awarded the Encouragement Prize by the Architectural Institute of Japan for his research contributions, Dr. Rijal also actively disseminates his findings through numerous publications and book chapters. His work bridges climate-responsive traditional wisdom with modern sustainable building design.

Assoc. Prof. Dr. Ram Kumar Solanki

Assoc. Prof. MIT-ADT University, Pune, India



Dr. Ram Kumar Solanki is a distinguished academic and researcher with over 18 years of experience in Computer Science and Engineering. Holding a Ph.D. from Dr. A.P.J. Abdul Kalam University, Indore (2023), with a thesis on “Designing and Enhancing Fingerprint Identification Systems Using Improved Image and Deep Learning Techniques,” he also earned an M.Tech in Software Engineering from Rajiv Gandhi Proudhyogiki Vishwavidyalaya, Bhopal, and a B.Tech in Computer Science & Engineering (First Division) from Uttar Pradesh Technical University, Lucknow (2006). Currently serving as Associate Professor and Coordinator of International Affairs at MIT School of Computing, Dr. Solanki has held key roles, including Head of Department and Assistant Professor at Wainganga College of Engineering & Management, Nagpur, and Lecturer at S.N.D. College of Engineering & Research Center, Nashik. Dr. Solanki specializes in Artificial Intelligence, Deep Learning, IoT Security, and Software Engineering. He has significantly contributed to curriculum development, innovative teaching methodologies, and international academic collaborations, including facilitating admissions, visa services, and Memorandums of Understanding (MOUs). He has organized high-impact events like the 2nd International E-Conference on Environment Sustainability and Teaching Methods in COVID-19 Scenario (2020) and the National Conference on Recent Trends in Computer Engineering (2019).

Assist. Prof. Dr. Niraj K.C.

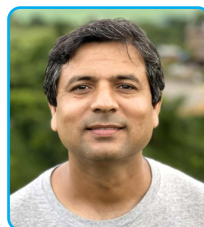
Dean, Lumbini Technological University, Nepal



Dr. Niraj K.C. is a dedicated Geospatial Scientist specializing in Remote Sensing, Machine Learning, Artificial Intelligence, and Landslide Early Warning Systems. He holds a Ph.D. in Geospatial Technology from IIT Mandi, India, where his research focused on the integration of optical and SAR (Synthetic Aperture Radar) data with AI/ML approaches for disaster risk assessment, urban sprawl monitoring, and climate change impact analysis. Currently serving as the Dean of Lumbini Technological University, Dr. K.C. has an outstanding academic and research portfolio with 16+ Q1/Q2 indexed publications in reputed international journals. In addition to his scholarly contributions, he actively mentors graduate and postgraduate students, guiding them in advanced geospatial applications and interdisciplinary research projects. His expertise spans across Python programming, GIS, GEE and InSAR, which he applies to develop sustainable, data-driven solutions for real-world challenges in disaster management, land use/land cover change, and environmental monitoring.

Assist. Prof. Dr. Nirjal Sapkota

*Assistant Professor, Department of Mathematics,
The University of Oklahoma, USA*



Dr. Nirjal Sapkota is a mathematician specializing in delay differential equations, stability and bifurcation analysis, and their applications to biological and dynamical systems. He earned his Ph.D. in Mathematics from The University of Texas at Dallas in 2022, where his research focused on modeling the human respiratory system using delay differential equations. His broader interests include machine learning, neural networks, and computational modeling. Dr. Sapkota has published in PLoS One and arXiv, and has extensive experience in teaching and mentoring at the undergraduate and graduate levels.

Biography of Invited Speaker

Dr. Abhishek Ghimire

Research Associate, University of Western Australia



Dr. Abhishek Ghimire is a Research Associate at the University of Western Australia, specializing in steel structures, high-strength steel connections, and numerical modelling. He holds a Ph.D. in Civil Engineering with a specialization in steel structures from Czech Technical University in Prague, a Master's in Civil Engineering through the prestigious Erasmus Mundus Scholarship, and a Bachelor's in Civil Engineering from Pokhara University under a full merit scholarship. With professional and research experience across Europe, Asia, and Australia, Dr. Ghimire's work—widely published in leading engineering journals—focuses on developing innovative and sustainable solutions to enhance structural performance and safety.

Dr. Shital Babu Acharya

Architect, K. Ito Architects & Engineers Inc., Australia



Dr. Shital Babu Acharya is the Founder and Principal Architect of the award-winning practice CA Design Solution, an architecture design studio based in Nepal. He also works with K. Ito Architects and Engineers Inc., Japan, delivering projects across South Asian countries, Japan, and Ethiopia. He serves on the Working Committee for Children, Youth, and Environment (CYE) Knowledge Network at the Environmental Design Research Association (EDRA), USA. Dr. Acharya has taught architecture and urban planning studios in Nepal and Japan. He specialises in educational facility planning, and his research advocates for integrating educational spaces within broader regional and urban infrastructure. His work on school–community functions as an integrated approach advances discourse on the effective use of public facilities to strengthen social bonds, enhance student agency, and improve learning outcomes. His current research focuses on place-based design, exploring how the built environment shapes social and cultural interactions in culturally diverse urban contexts.

Abstracts of Keynote Speakers

Adoption of Cloud Computing in Government

Subarna Shakya^{1*}

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Pulchowk Campus, Institute of Engineering,
Tribhuvan University, Nepal

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Abstract

Cloud Computing is an internet-based computing where all the shared resources, software and information are provided to the computers and devices on demand. Users can access the information from anywhere and anytime. E-Governance plays a vital role in any organization and clouds with different layers are helpful to the e-Governance services. Cloud services are helpful to reduce the cost of infrastructure and software cost. This keynote concentrates on the adopt of cloud computing in governments to reduce infrastructure, and platform cost, to increase network security, to increase scalability and quick implementation. The results reveal that cloud computing adoption could help solve problems such as infrastructure issues, cost issues, and improve service delivery and transparency. Propose that cloud computing has the potential to offer benefits to both implementation of efficient e-government services and to users of those service. Explore the issues and challenges affecting the adoption of cloud computing in government services. At the end of this key note some

recommendation of adoption of cloud computing in government services.

Keywords: Adoption, cloud computing, cloud services, network security, scalability, e-government services

Engineering the Future: AI, IoT, and Secure Systems for Sustainable and Resilient Infrastructure

Sudan Jha^{1*}

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Kathmandu University, Nepal*

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Abstract

The global rush to integrate Artificial Intelligence (AI) and the Internet of Things (IoT) presents a critical strategic choice for developing nations like Nepal: to remain mere consumers of foreign technology or to architect a sovereign, secure, and sustainable digital ecosystem. This keynote address explores the latter path, outlining a framework for leveraging emerging technologies as fundamental engineering components for national development. We move beyond theoretical discussion to present a practical blueprint based on three interconnected pillars. First, we examine the concept of a "Digitally Green" foundation, advocating for the use of Nepal's renewable hydropower resources to support sustainable AI compute and data centers, turning an environmental challenge into a strategic advantage. Second, we address the non-negotiable pillar of security, detailing how AI-driven cybersecurity systems, trained on local threat intelligence, can proactively protect critical infrastructure and build trust in the digital economy. Finally, we explore transformative applications across verticals, from precision agriculture using IoT and Small Language Models (SLMs) to disaster management and logistics

revolutionized by long-range, low-power LoRaWAN networks and autonomous drone corridors. This talk argues that technologies like Reconfigurable Intelligent Surfaces (RIS) to overcome mountainous terrain, LiFi for secure connectivity, and indigenous AI solutions are not just IT products but are critical engineering innovations. By adopting this integrated approach, Nepal can leapfrog traditional infrastructure limitations, build resilient systems, and engineer a future that is not only technologically advanced but also secure, sovereign, and sustainable.

Keywords: Artificial Intelligence (AI), Internet of Things (IoT), Cybersecurity, Sustainable Technology, Digital Infrastructure, Reconfigurable Intelligent Surfaces (RIS), Disaster Risk Management, LoRaWAN, Sovereign Digital Economy, Nepal.

From Challenge to Breakthrough: A Step-by-Step Journey in High Ductile Mortar (HDM) Development

Tek Raj Gyawali^{1*}

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Abstract

Plain concrete is very strong in compression but exhibits significant weakness in tension, often failing in a brittle manner. In reinforced concrete structures, the concrete primarily resists compressive stresses, while embedded reinforcement bars (rebar) are designed to carry all tensile stresses and any remaining compressive loads not taken by the concrete. However, for certain advanced structures—such as tunnel linings (segments), airport runways, shear walls, and permanent formwork—fiber reinforced concrete (FRC) is preferred over plain concrete to enhance mechanical performance. In the early stages of FRC development, steel fibers (SF) were predominantly used to improve the flexural tensile strength and ductility of concrete. In applications such as tunnel segments and permanent formwork, FRC with 2.0–2.5% SF by weight has been used to achieve flexural strengths exceeding 12 MPa. However, over time, the durability of such structures was compromised due to the rusting tendency of steel fibers. To address this issue, various non-corrosive synthetic fibers have been developed and extensively studied as potential replacements for steel fibers, with the goal of maintaining or

improving mechanical performance. Among these alternatives, polyvinyl alcohol (PVA) fibers have shown promise due to their high tensile strength, surpassing that of steel fibers. This article outlines the technical progression of a three-year research project aimed at developing a fiber-reinforced mortar composite using PVA fibers in place of steel fibers, specifically for use in tunnel segments and permanent formwork. The research began with the formulation of a hypothesis and systematically addressed each challenge, ultimately leading to the development of what is now termed High Ductile Mortar (HDM). Various parameters were optimized to enhance the flexural strength to a target of 12 MPa. Laboratory testing confirmed a flexural strength of 13.5 MPa. In the final phase, HDM was produced at a construction site batching plant and used to fabricate full-scale segments. However, the average flexural strength achieved was only 7.5 MPa—significantly below the target—posing a major setback for the project. Following an in-depth investigation into the cause of failure, appropriate corrective actions were taken, resulting in a revised mixing process that achieved an average flexural strength of 15.5 MPa. This research journey highlights the importance of goal-oriented experimentation, iterative problem-solving, and persistence in overcoming challenges to successfully meet performance targets.

Keywords: High Ductile Mortar (HDM) Development, high tensile strength, FRC

Governance in Physical Infrastructure Delivery: Need for Legal, Institutional and Technical Integration

Rajendra Prasad Adhikari^{1*}

Infrastructure, Public Procurement, Contract Management & Dispute Resolution Expert and Chairperson of Nepal Council of Arbitration, NEPCA

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Abstract

Development of physical infrastructure involves six major components- (i) Identification and selection of needed projects (ii) Public procurement (iii) Construction management (iv) Contract Administration (v) Dispute resolution, and (vi) Service delivery (Operation and maintenance). Therefore, civil engineering infrastructure must look beyond technical aspect acknowledging that technical aspect is the backbone of civil engineering infrastructure. Whereas, governance is to deliver what has been said. In this context, making any public expenditure in physical infrastructure must deliver the service first followed by contributing on employment generation and operationalizing overall economic activity of the country. Today's project design and construction activities must think about the use of BIM, climate resilient design and other new technologies for improved-efficiency, enhanced-transparency and true-sensed accountability. Integrated understanding therefore is crucial for successful infrastructure development. Lagging timely delivery of services means weak governance means the government's failure and loss in credibility. This keynote presentation will focus on overall legal framework, institutional capacity and technological development influencing various aspects related to physical infrastructure development and service delivery. It discusses on the

existing gaps and urge the policy makers and practitioners to work collaboratively for bridging such gaps and overcoming the challenges.

Keywords: Construction, Governance, Physical infrastructure, Technology, Service delivery.

Advancing Urban Flood Resilience with Integrated Hydrologic–Hydraulic Models and Green Stormwater Infrastructure

Binaya Kumar Mishra^{1*}

¹ *Professor, School of Engineering, Pokhara University, Nepal*

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Abstract

Climate change is intensifying extreme rainfall events, increasing urban flood risks, particularly in rapidly urbanizing countries like Nepal. In the Kathmandu Valley, monsoon-induced inundation has become more frequent, causing major socio-economic impacts. This study assesses future flood hazards in the lower Manohara River Basin, a key tributary of the Bagmati River system. The HEC-HMS hydrologic model was coupled with the two-dimensional HEC-RAS hydraulic model to simulate upstream runoff and downstream inundation. High-resolution precipitation data from the Non-Hydrostatic Regional Climate Model (NHRCM) under the SSP5-8.5 scenario were used to estimate flood hazards for return periods of 5–100 years under historical (1981–2000) and future (2080–2099) conditions. Model calibration against the August 9-10, 2022 flood event showed good performance. Results indicate that increasing recurrence intervals and climate change both amplify flood depth and inundation extent, shifting low-risk areas into medium- and high-risk zones. To address these risks, the study highlights the importance of integrating Green Stormwater Infrastructure strategies into urban

planning. Approaches such as permeable pavements, infiltration trenches, basins, and stormwater reuse systems can reduce runoff, improve water quality, and enhance urban resilience. Together, advanced flood modeling and sustainable stormwater management provide pathways to mitigate future flood impacts and support resilient urban development in the Kathmandu Valley.

Keywords: Hydrologic model, high-risk zones, permeable pavements

Thermal Adaptation of Buildings and People for Energy Saving in Nepal

Hom Bahadur Rijal^{1*}

*¹Graduate School of Environmental and Information Studies,
Tokyo City University*

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Abstract

The thermal adaptation of buildings and people is important for energy-saving building design. Thermal measurements and comfort surveys in buildings were conducted across various climates and regions of Nepal. Passive heating and cooling effects were observed in traditional buildings. People were highly satisfied with the thermal environment, and regional as well as seasonal differences were found in comfort temperature. These findings indicate that people are well adapted to the thermal environments of the investigated buildings, resulting in comfort temperatures that are lower or higher than conventional thermal comfort standards. Consequently, a significant amount of energy can be saved through passive building design and adaptive temperature settings for heating and cooling.

Keywords: thermal adaptation, energy, traditional buildings

Advance analysis of the intense-deformed condition of crossing sectors of thin shells with method of super element method

Govinda Prasad Lamichhane^{1*}

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Abstract

In introduction the maintenance of an object of research reveals, the urgency of a theme of the dissertation is proved, the purpose of research is formulated; the summary of work and substantive provisions, explanation on defend is stated. In the first chapter the brief historical review of development of a modern condition of the theory of environments is given and the general condition of the theory and methods of calculation of environments is considered. In the separate paragraph the brief review of the theory and methods of calculation of environments of complex geometry is studied. The basic works on geometry of carved surfaces of Mongues are marked and also the merit of faculty of resistance of materials of the Russian university of friendship of people in development of methods of calculation on durability of shells in the complex form is marked. The modern condition Variation-Differentiation methods of calculation thin shell designs is considered and the review of the scientific literature on Variation-Differentiation to methods of the decision of

problems of calculation thin shell designs is resulted. In the second chapter the algorithm Variation-Differentiation method of calculation of plates and shells of complex geometry is described. Calculation of such designs is carried out, basically, various numerical methods, in particular, method of final elements widely widespread in last decades. Alternative to this method can make, in our opinion, Variation-Differentiation method. In a basis of Variation-Differentiation method principle Lagrange – a principle of a minimum of full energy of deformation is considered. The third chapter is devoted to studying of designs and examples of crossed compartments of environments. The algorithm and the program Variation-Differentiation method in a combination to a method of the global elements, developed for research of units of stationary sea platforms is marked, that, considered an opportunity of crossings of flat elements (plates) and compartments of flat and cylindrical environments. Research of tensely deformed condition of crossings of sectors of complex geometry demands completion of algorithm of a method of global elements.

Keywords: thin shell designs, super element method, algorithm

Hybrid Deep Learning-Based Security Model for Robust Intrusion Detection in IoT Networks

Ram Kumar Solanki¹

*¹Assoc. Prof. and Chief Coordinator, Office for International Affairs
School of Computing, MIT Art, Design and Technology, Pune, India*

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Abstract

The rapid proliferation of Internet of Things (IoT) devices has transformed various sectors, but it has also introduced significant security challenges due to the vulnerability of these networks to intrusions. This paper proposes a hybrid deep learning-based security model designed to enhance intrusion detection in IoT networks. The model integrates Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks to effectively capture spatial and temporal patterns in network traffic data, respectively. By leveraging the strengths of both architectures, the proposed approach achieves robust feature extraction and sequential anomaly detection, addressing the limitations of traditional machine learning methods in handling dynamic and high-dimensional IoT data. The model is trained and evaluated using a comprehensive dataset simulating real-world IoT network scenarios, including diverse attack types such as Distributed Denial of Service (DDoS), Man-in-the-Middle (MITM), and zero-day exploits. Experimental results demonstrate that the hybrid model achieves an accuracy of 97.8%, a false positive rate of 1.5%, and a detection rate of 96.3% for unseen threats, outperforming

standalone deep learning models. This research underscores the potential of hybrid deep learning frameworks in providing resilient security solutions for IoT ecosystems, paving the way for scalable and adaptive intrusion detection systems in next-generation networks.

Keywords: Hybrid Deep Learning, Intrusion Detection, IoT Security, Convolutional Neural Networks (CNN), Long Short-Term Memory (LSTM), Network Security

Parameter estimation of a two state delay differential equation modeling the human respiratory system

Nirjal Sapkota¹ and Janos Tori²

¹*Assist. Professor, Department of Mathematical Science, The University of Oklahoma, USA*

²*Assist. Professor, Department of Mathematical Science, University of Texas, Dallas, USA*

**Corresponding email: nsa311@gmail.com*

Abstract

We study parameter estimation for a two-state model that describes the dynamic balance of carbon dioxide and oxygen in the human respiratory system. The model is nonlinear and parameter-dependent, and due to transport delays in the respiratory control system, it is formulated as a system of delay differential equations. To evaluate the performance of the estimation methods, noisy data are numerically simulated under realistic physiological conditions. Several case studies are conducted to investigate the effectiveness of the Levenberg–Marquardt and Trust-region algorithms in accurately identifying the unknown model parameters. The results demonstrate the capability of these optimization techniques to handle nonlinearity and delays in the system, providing insights into the sensitivity of respiratory dynamics and potential applications in medical monitoring and control of respiratory functions.

Keywords: Differential Equation Modeling, nonlinearity

Abstracts of Invited Speaker

Architecture of Belonging: Reimagining Schools from Classrooms to Community

Shital Babu Acharya^{1*}

¹*Architecture and Planner, Australia*

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Abstract

Schools hold a unique capacity to blend the social and cultural fabric of the community and expand learning opportunities within their additional layer of community space. However, when schools function only as instructional spaces, much of their potential remains untapped. While co-design has gained popularity these days, a solid foundation of community approach has not been prioritised in many parts of the current schooling system. Nepalese schools demonstrate significant cases in creating opportunities from this approach and can also be taken as an example. My research on School–Community Functions as an Integrated Approach suggests how learning environments can be reimagined through spatial strategies grounded in community partnership. How the integration of school-community functions, community role models in teaching, and facilitating engagement activities within a community hub can enhance a school’s capacity in terms of physical infrastructures as well as learning resources. Result of the studies show how such integration fosters student agency, knowledge exchange, and social cohesion. It covers both public and private schools in urban and regional contexts, where

facilities are lacking or underutilized. The discussion highlights the efforts as well as the reluctance of schools in adopting community models, despite the underutilization of school facilities and the missed opportunities for schools to act as civic anchors. It presents a planning framework for school functions as transformative social infrastructure, with actionable guidelines for policymakers, educators, and designers.

Keywords: School–Community Functions, physical infrastructures

Advancing the Design of High-Strength Steel Welded Connections: A Numerical Approach with Plastic Strain Limits

Abhishek Ghimire^{1*}

¹*Research Associate, University of Western Australia*

**Corresponding email: abhi.ghimire45@gmail.com*

Abstract

High-strength steels (HSSs) are becoming more common in the steel market, playing a crucial role in modern structural engineering due to their improved performance and sustainability. This study enhances the previously proposed Regular Inclined Shell Element Model (RISEM) by integrating plastic strain limit criteria to improve the predictive accuracy of welded connection designs. The extended model aligns with Eurocode standards and demonstrates substantial verification analytical benchmarks by focusing on equivalent plastic strain as a failure criterion. This advancement enables accurate prediction of weld resistance, reduces reliance on extensive material testing, and supports sustainable construction practices. The findings offer practical design recommendations for engineers to optimize high-strength steel (HSS) welded connections, ensuring structural safety, reliability, and efficiency across diverse applications.

Keywords: High-strength steel, Regular Inclined Shell Element Model, plastic strain limit, analytical model, welded connections

Abstracts of Presenters

Improving Trust in Tunneling ML Models with XAI: SHAP- Based Explainability

Abishek Shrestha^{1*}

¹Department of Geosciences, Norwegian University of Science and Technology NTNU, Norway

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Abstract

Machine learning (ML) approaches are increasingly used in tunnelling, where data driven methods can support decision making. However, powerful models such as Random Forest and XGBOOST are often viewed as black boxes, which limits their acceptance in practice. This work applies explainable AI (XAI), specifically SHAP (SHapley Additive exPlanations), to improve model explainability. SHAP reveals complex relationships among variables and improves both global and local interpretability. The study presents a practical workflow for training, explaining, and validating Random Forest and XGBOOST models on tunnelling data, showing how SHAP can increase model transparency.

Keywords: Black box, Machine learning, XAI, SHAP

Architectural Insights From Urban Public Open Space Use Behavior: A Case of Basundhara Park, Pokhara

Ananta Gautam^{1*}

¹Assistant Professor, Department of Architecture, Pokhara Engineering College, Nepal

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Abstract

Urban public open spaces are parts of cities that are open to the public and provide chances for leisure, socializing, and community involvement. With their positive effects on social cohesion, physical and mental health, and general quality of life, these areas are crucial to a vibrant urban setting. Lack of design criteria, inadequate funding, and low public participation have rendered many open spaces unproductive and unable to satisfy the modern needs of a wide range of groups of people, causing them to fall short of national or urban standards. This study examines how people actually use urban open spaces so that architects and planners can uncover the design issues and opportunities for improving spatial quality. A self-administered questionnaire survey and observations utilizing the metrics from the Place Making Diagram, such as accessibility, comfort, activities, and sociability, suggested by the Project for Public Spaces (PPS) to evaluate park use, were part of the mixed method approach taken into consideration for data collection. The research found that although Basundhara Park draws a varied user base and provides decent

accessibility, its function as a public open space is restricted by insufficient facilities, absence of organized activities, and minimal social interaction, underscoring the necessity for design and management improvements based on PPS indicators. The study assists authorities, planners, and designers in creating projects that prioritize local people and make public open spaces sustainable, inclusive, and functional.

Keywords: urban, public open space, user behavior, quality, activities

Document Summarization Using Convolution Neural Networks

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Abstract

Extractive summarization aims to generate a summary by ranking sentences, whose performances relies heavily on the quality of sentence features. In this thesis, a document summarization framework using convolutional neural networks is successfully developed to learn sentence features and perform sentence ranking jointly. The CNN model in this thesis addresses a regression process for sentence ranking-trained word vectors are used to enhance the performance of the model. The proposed model is evaluated using DUC 2006 and DUC 2007 datasets covering single and multi-document summarization tasks respectively. The proposed system achieves competitive or even better performance compared with state-of-the art document summarization systems. The evaluation of summaries is done using ROUGE. ROUGE is very widely adopted method for evaluation of summaries. It has been adopted by DUC for its task as well. The results of the evaluation showed that our system indeed performed very well for multi document summarization task. In the upcoming section the methods for summarization and the results will be presented.

Key Words: CNN, DUC, ROUGE, summarization

Development of a Streamlit-Based Deep Learning Tool for Instant Soil Classification from Borehole Grain Size Data

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Abstract

Soil classification is an important part of geology in geotechnical engineering, because it affects the design of foundations, slope stability, and the safety of the construction site. This study presents an easy, dependable, and intelligent soil classification framework using a Multilayer Perceptron (MLP) deep learning model. Data used to train the MLP model included both real borehole grain size distributions and synthetic granular soil data, with synthetically generated data used due to the limitations of previously small datasets in terms of size. Inputs included percentages of gravel, sand, and fines, metrics for grain size such as D10, D30, D50, and D60, and Gs. The MLP model was developed to classify soil according to the Unified Soil Classification System (USCS). MLP model training was monitored using a loss curve, while performance evaluation utilized a confusion matrix, with precision, recall, and F1-score

metrics being evaluated on a class-by-class basis so the assessments of classification accuracy can be robust. The proposed classification method showed high performance in soil classification during the entire USCS, thus offering geotechnical engineers an alternative to the slow, manual soil classification techniques that may be fallible due to human error. To improve ease of access and use, a website-based platform through Streamlit was developed to allow geotechnical engineers to input grain size data, obtain soil types, and visualize performance in real time. This tool is designed to eliminate mistakes, allow for fast analysis, and advance data-driven decisions in geotechnical investigations.

Keywords: Soil Classification, Deep Learning, Streamlit Application, Grain Size Distribution, USCS system.

A Synthesis of Online Travel Reviews, Sentiment Models, and Computational Methods for Tourism Research in Nepal

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Abstract

Online Travel Reviews (OTRs) are now one of the main ways tourists and managers learn about destinations. Unlike traditional surveys, OTRs give real and personal experiences shared by travellers. However, many online descriptions of destinations are still incomplete, too general, or even biased. This makes it difficult for visitors to fully understand places and plan their trips properly. Seasonal changes are also rarely explained, even though they can strongly affect experiences. For example, Devi's Fall in Pokhara looks very different in the dry and rainy seasons, but this detail is often missing in official information. This study explores the existing literature on user-generated content (UGC), aspect extraction, sentiment analysis, and models like the Kano model that measure visitor satisfaction. It shows that most traditional methods focus only on fixed features and structured data and often ignore seasonal and real-time tourist experiences. New research is starting to use Natural Language Processing (NLP), machine learning (ML), and clustering

methods to analyze reviews, find important aspects, and classify destinations. But Nepal is still less studied in this area. This paper highlights the gaps in current research and suggests ways to use NLP, sentiment analysis, and clustering with international tourism categories (like UNWTO) to better understand how tourists see and feel about destinations.

Keywords: Online Travel Reviews; User-Generated Content; Destination Image; Natural Language Processing; Clustering; Aspect Extraction; Tourism Satisfaction, Nepal Tourism

Serviceability of Water Supply Projects of Madi Rural Municipality: A case study on Yangjakot Water Supply Project

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Abstract

This study examines serviceability issues of rural water supply projects in Madi Rural Municipality, focusing on the Yangjakot Water Supply Project in Madi RM-3. Despite Nepal's abundant freshwater resources, rural areas continue to face challenges in delivering consistent, reliable, and safe drinking water. The research adopts a quantitative case study approach, integrating primary data from 73 households through structured questionnaires, field observations, and laboratory water quality testing. Four indicators—water quality, quantity, system reliability, and water service cost—were assessed. Findings show that the project performs well in terms of water quantity, system reliability, and affordability of water service costs. However, water quality emerged as a major concern, with evidence of total coliform contamination, infrequent testing, and inadequate treatment infrastructure, posing potential health risks. Financial sustainability was also highlighted as critical to long-term functionality, with residents emphasizing the need for external financial support to upgrade infrastructure and technology. The study

underscores the importance of community participation, the skills of Village Maintenance Workers (VMWs), effective management by Water Users and Sanitation Committees (WUSCs), and robust maintenance strategies in improving serviceability. Recommendations include implementing regular water quality monitoring, adopting preventive maintenance measures, and establishing sustainable fund management mechanisms. These actions are vital for ensuring project resilience and align with broader goals for achieving Sustainable Development Goals (SDGs) related to public health and socioeconomic development in rural Nepal.

Keywords: Serviceability, Quality, Quantity, System reliability, Water service cost, Coliform contamination.

Water Treatment Efficiency Evaluation of Treatment Plant - A Case Study of Bhadgaun Water Supply Project

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Abstract

Ensuring an adequate supply of potable water in rapidly urbanizing regions poses increasing challenges due to limited water resources, aging infrastructure, and climate variability. This study evaluates the treatment efficiency of the Bhadgaun Water Supply Project by analyzing key physical (Turbidity, EC, pH, TDS) and microbiological (E. coli, Total Coliform) parameters across major treatment stages—sedimentation, roughing filtration, slow sand filtration, and chlorination—during both monsoon and dry seasons. Results showed significant seasonal variation, with monsoon raw water exhibiting turbidity up to 4.63 NTU, EC of 361 $\mu\text{S}/\text{cm}$, and E. coli counts as high as 96 CFU/100ml. The Slow Sand Filter achieved up to 84% turbidity and 71% E. coli reduction. Post-chlorination, microbial contamination was fully removed, ensuring compliance with NDWQS 2022. TDS levels dropped from 261 mg/L to 103 mg/L during monsoon and from 112 mg/L to 76 mg/L during the dry season. Slight reductions in overall efficiency were observed in the dry season due to lower

contaminant loads, affecting filter performance. These findings highlight the effectiveness of the existing system and the need for regular monitoring and timely maintenance to ensure consistent delivery of safe drinking water.

Keywords: Water quality, treatment efficiency, seasonal variation, NDWQS, Bhadgaun Water Supply Project.

Performance Assessment of Road construction Projects in Gandaki Province using Earned Value Analysis

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Abstract

Road networks play a vital role in national development, but Nepal's diverse terrain poses challenges for road construction, often leading to time and cost overruns. This study analyzes the schedule and cost performance of road projects under the Gandaki Province Government using Earned Value Analysis (EVA) and ranks the influencing factors. Data were collected through questionnaires and project documents using a descriptive cross-sectional design. Statistical tools like RII and Kendall's tau were used for analysis. EVA results showed that about two-thirds of projects were behind schedule and half were under budget. Key factors affecting schedule performance included delayed budget release, contractor financing issues, and decision-making delays. Cost performance was mainly impacted by cash flow problems, scope changes, material price fluctuations, and poor site management.

Keywords: Earned Value Analysis, Project Performance, Cronbach Alpha, Relative Importance Index.

Analysis of Construction Projects Across Countries: Developed and Developing Countries

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Abstract

This study analyzes the different models of construction projects of developed and developing countries. The sample taken is Perth, Australia as developed country, and as developing countries Aweil of South Sudan, and Pokhara of Nepal. The construction projects chosen are public infrastructure projects from Australia, South Sudan and Nepal. The method adopted is the observation of the sites, and depth interviews with stakeholders: government officials, contractors, clients, and engineers and other technicians involved in construction. Preliminary findings shows that factors affecting are project approval system, monitoring methodology, level of skills and efficiency of engineers, contractors, government officials, topology, budget and governing authorities. Additionally, differences were observed in the use of modern technology, transparency in procurement processes, and stakeholder's participation. The study highlights how institutional capacity significantly influences project implementation, timelines, and quality. These insights are expected to contribute to a better understanding of the challenges and opportunities for improving

construction practices in developing countries by drawing lessons from developed country models.

Keywords: byelaws, construction, budget, and technology

Assessment of Road Pavement Condition using Pavement Condition Index (PCI) method in Parbat District

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Abstract

This study assessed the pavement condition of selected asphalt roads in Parbat District, Nepal, using the Pavement Condition Index (PCI) method as per ASTM D6433-18. Field surveys were conducted on 61 sample units across four road sections to identify surface distresses and calculate PCI values. Results showed 2 units in “Good,” 39 in “Satisfactory,” 12 in “Fair,” 3 in “Poor,” 1 in “Very Poor,” and 4 in “Failed” condition. The Pokhara–Baglung Highway sections had higher PCI values, while other sections showed lower ratings. Weathering and ravelling were the most common distresses. The study recommends timely maintenance and rehabilitation to improve road performance and longevity.

Keywords: Pavement Condition Index (PCI), Pavement distress, Pavement Condition Rating, Visual surveys.

Strengthening Disaster Risk Reduction in Nepal: From Policy to Practice

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Abstract

Nepal was the first country in South Asia to enact a disaster management law in 1981. Despite this early initiative, the frequency and impact of disaster events have continued to rise. In response, the Government of Nepal introduced the Disaster Risk Reduction and Management (DRRM) Act, 2017, aiming to provide a comprehensive framework for disaster risk governance. This legislation promotes a “whole-of-society” approach, emphasizing inclusive participation, ownership, and accountability in disaster risk management (DRM). This study critically examines existing DRM policies and identifies key gaps in implementation. Findings reveal a concerning upward trend in both human casualties and economic losses, despite the proliferation of policies and institutional efforts. The recent establishment of the National Disaster Risk Reduction and Management Authority (NDRRMA) marks a significant institutional advancement. However, persistent under-expenditure of allocated budgets and inadequate integration of DRR into development planning continue to undermine resilience efforts. The Ministry of Home Affairs (MoHA) remains the lead agency for disaster

management, yet the transition to a federal governance system has not been matched by clear mechanisms for DRM at the provincial and local levels. District Disaster Relief Committees (DDRCs) remain operational but face challenges due to limited data systems, insufficient trained personnel, and constrained financial and logistical resources. While all districts have Disaster Preparedness and Response Plans (DPRPs), their effectiveness is hampered by resource deficits and lack of operational readiness, including the absence of stockpiled search and rescue kits and survival supplies. Current policies remain largely reactive, with a focus on relief distribution rather than proactive risk reduction. Annual budgets at both national and local levels prioritize traditional infrastructure development, often neglecting DRR integration. This disconnect has hindered poverty alleviation efforts and exacerbated vulnerability. Furthermore, limited community engagement in project cycle management, minimal private sector involvement, and weak institutional coordination continue to pose significant barriers to effective disaster risk governance.

Keywords: Disaster Risk Management, Community participation, economic loss, Data management.

A Comparative Study of Road Projects Completed by Users Committee and Contractor Based approach in Gandaki Rural Municipality, Gorkha

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Abstract

Nepal, as a developing nation, is placing substantial emphasis on infrastructure development to foster socio-economic growth and improve connectivity. Among the most widely practiced procurement methods by local governments are the contractor-based approach and the user committee approach. Although the selection of method varies with contextual circumstances, both are intended to ensure efficiency in terms of time, cost, and quality. This study conducts a comparative evaluation of these two procurement strategies within the Nepalese rural context, employing performance indicators derived from field observations and stakeholder feedback. The overarching objective is to determine the most feasible and effective approach for rural municipalities under existing resource and capacity constraints. The research examined distinct road construction projects implemented under the Gandaki Rural Municipality. Systematic observations of these projects informed the design of structured questionnaires, which were distributed to relevant stakeholders to assess the theoretical

dimensions of procurement performance. Complementarily, physical observations were undertaken to evaluate project quality, timeliness, and financial progress, and the data were tabulated for statistical analysis. Findings indicate that there is no statistically significant difference between the two approaches, as both exhibit distinct advantages and limitations. Neither method emerges as entirely optimal. The user committee approach shows notable strengths in stakeholder engagement, planning, structuring, and inclusiveness, yet demonstrates weaknesses in scheduling, environmental considerations, and safety measures, which require urgent improvement. Conversely, the contractor-based approach proves comparatively stronger in handling complex tasks, adhering to safety protocols, scheduling, and ensuring construction quality, though it still requires enhanced monitoring and transparency. The study concludes that the choice of procurement method should be determined by project-specific conditions, resource availability, and governance capacity, rather than by a one-size-fits-all approach. The findings contribute to evidence-based decision-making for local governments, offering practical insights to improve procurement efficiency and enhance infrastructure delivery in rural Nepal.

Keywords: Construction, Procurement, Strategies, Stakeholders, Rural Infrastructure, Nepal

Analyzing the Gap Between IT Curriculum and Industry Demand In Nepal Using NLP

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Abstract

Bridging the gap between academic IT curricula and industry expectations remains a major challenge in Nepal's fast-evolving technological landscape. This study proposes a data-driven framework to evaluate curriculum–industry alignment using Natural Language Processing (NLP) methods. Course outlines from leading universities and IT job postings were analyzed with BERT-based embeddings to calculate semantic similarity scores, classifying courses into high, medium, or low alignment categories. Simultaneously, KeyBERT was employed to extract relevant skills, tools, and technologies from both datasets, enabling the computation of keyword coverage. A composite alignment score was then derived by combining semantic similarity with keyword overlap, offering a comprehensive assessment across knowledge domains, technical skills, and professional competencies. The analysis revealed distinct gaps: Knowledge Gap (0.40), Technical Skills Gap (0.25), and Competency Gap (0.40), resulting in an Overall Gap of 0.34 and an

Alignment Index of 0.66. These findings suggest moderate alignment while highlighting the under representation of emerging technologies and employability skills. The proposed methodology provides a reproducible and quantitative approach for identifying gaps, offering actionable insights for educators, curriculum designers, and policymakers to modernize IT programs and enhance industry responsiveness.

Keywords: IT curriculum, industry demand, NLP, BERT, curriculum industry alignment, Nepal

AI and the Future of Healthcare in Nepal: Opportunities, Challenges, and Risk Management Strategies.

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Abstract

Healthcare stands out as a key sector for AI impact due to the high volume of data, critical need for precision, and chronic human resource shortages in many regions. AI has the potential to make healthcare more accessible, efficient, and personalized, especially in underserved populations in developing countries like Nepal. With its ability to provide enhanced diagnostic support, automate routine clinical tasks, and facilitate remote healthcare access, AI holds significant promise in addressing Nepal's healthcare challenges, including critical workforce shortages, limited infrastructure, and geographical barriers. However, its deployment comes with notable risks such as data privacy concerns, algorithmic bias, hallucinations and governance issues. This research explores the current landscape and future potential of AI in Nepalese healthcare, drawing comparisons with India and China, which have adopted distinctive AI strategies in their healthcare system. Using recent academic literature, policy documents, and pilot implementations, the study provides a structured roadmap to responsibly integrate AI into

Nepal's health system. The research concludes with recommendations emphasizing AI education & sensitization, stakeholder engagement, regulatory development, and the creation of a localized Responsible AI Framework tailored for Nepal.

Keywords: AI Framework, limited infrastructure, geographical barriers

Study on Quality of Concrete by Using Blended Aggregates of Pame and Seti River Basins

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Abstract

The quality and performance of concrete are significantly influenced by the physical and mechanical properties of aggregates. This study investigates the effect of using blended river aggregates from the Pame and Seti (Hemja) River basins on the mechanical properties of concrete. Aggregates were collected from Pame, Hemja, Bagmara, and Kotrey regions of the Seti River system in the Kaski District, Nepal. Concrete mixes were prepared with 100% individual river aggregates as well as blended proportions of Pame and Hemja aggregates in ratios of 75:25, 50:50, and 25:75. Standard cubes, cylinders, and beams were cast to determine compressive, tensile, and flexural strengths at 7, 14, and 28 days of curing. Experimental results revealed that concrete with blended aggregates exhibited superior performance compared to single-source aggregates. The compressive strength of mixes ranged from 25.39 MPa (Pame 100%) to 32.65 MPa (Pame25%–Hemja75%) at 28 days, indicating a strength gain of approximately 28% due to blending. Similarly, the tensile strength improved from 2.27 MPa (Pame 100%) to 3.02 MPa (Pame25%–

Hemja75%), while flexural strength increased from 4.27 MPa (Pame 100%) to 6.07 MPa (Pame25%–Hemja75%) at 28 days. Among the blended mixes, Pame25%–Hemja75% consistently achieved the highest strength values across all tests, demonstrating optimum interlocking, packing density, and bonding characteristics. The study concludes that blending river aggregates significantly enhances the mechanical properties and overall quality of concrete. The combination of angular, rough-textured Hemja aggregates with the smoother Pame aggregates results in improved workability, reduced voids, and better strength development. Therefore, a 25% Pame – 75% Hemja aggregate blend is recommended for general structural applications to achieve balanced strength, durability, and sustainability. The findings support the use of locally available blended river aggregates as a sustainable alternative to single-source materials in concrete production within Nepal's hilly regions.

Keywords: blended aggregates, quality, compressive, tensile, flexural strengths

Seismic Vulnerability Assessment of Plan Irregularity Reinforced Concrete Framed Building

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Abstract

Seismic Vulnerability Assessment is the process of evaluating a structure's susceptibility to damage during an earthquake. It identifies weaknesses and estimates the potential impact, helping to plan for retrofitting and risk reduction. At PEC, there are a total of 5 blocks among which Block-B, established in 2000 AD was selected for detailed assessment due to its structural irregularities. The assessment was carried out using visual inspection based on FEMA guidelines to identify visible structural deficiencies and was found vulnerable. NDT (Ultrasonic Pulse Velocity and Rebound Hammer) based on IS 13311 (Part 1/2):1992 and IS 516 (part 5, Section 1/4):2020 to evaluate material strength, and structural modelling of the structure using ETABS v20.0 based on NBC 105:2020 to understand its seismic performance. Quantitatively, the structural analysis showed that a total of 165 members failed in seismic checks including axial stress, allowable torsion irregularities and displacement limits To address

these issues, a strengthening plan was developed that included concrete jacketing for columns and beams, steel jacketing for selected beams, and the addition of shear walls. Post-strengthening analysis showed significant improvements in storey displacements and torsional behaviour, confirming that the proposed solutions effectively enhance the building's earthquake resilience and bring its performance closer to national seismic safety standards. Furthermore, cost estimation was carried out to assess economic feasibility. The cost of strengthening was compared with the cost of constructing a new building using the plinth area rate method. Strengthening was recommended only if the cost remained below 30% of new construction cost; otherwise, demolition and reconstruction were advised.

Keywords: Seismic Vulnerability, Qualitative, Non-Destructive Test, Strengthening, Jacketing

Assessment of Time and Cost Overrun of Province Level Construction Project in Tanahun, Gandaki Province, Nepal

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Abstract

The most prevalent issues that have a significant negative influence on the project and the parties involved are time and cost overrun. In Nepal, the construction industry is frequently facing various problems, including cost, quality and time. The study's primary objective is to identify the main causes contributing to time and cost overrun in execution of construction Project. The study includes detail on the completed multiyear province level construction projects that were implemented in Tanahun district from fiscal year FY 2075/76 - FY 2079/80 through National Competitive Bidding (NCB) to analyze time and cost overrun. Also, a review of the literature was done to determine the 78 causes of time and cost overrun and the 17-mitigation measure of those time and cost overrun. Technical client representatives, consultants, and contractors were surveyed using a questionnaire to get their opinions on the causes and mitigation measures. Based on the responses of 71 respondents five most

significant causes of time and cost overrun according to the Relative Importance Index (RII) and focus group discussion were: 1) Poor controlling of sub-contractor(s) by the contractor, 2) Improper technical studies by the contractor during the bidding stage, 3) Poor communications and misunderstanding, 4) Low bidding of contract, 5) Unavailability of construction material testing lab. Five main mitigation measure for time and cost overrun were: 1) Selecting a consultant who has sufficient experiences in similar nature of works and has good reputation, 2) Develop competent teams for executing works, 3) Effective planning and scheduling, 4) Select experienced and capable subcontractors, 5) Development of a proper system of site management and supervision. Among 15 multiyear construction projects of Tanahun district undertaken under NCB, 11 projects (80.00%) experienced time overrun. Time overrun range from 21.21% % to 304.38%.. Risti khola bridge (Sotibesi) of 21.21% % due to omission of quantity in original BoQ and Roadway Upgrading Works along Kalimati Dudhekuna Manechauka experienced the highest cost overrun of 304.38% due to the COVID- 19, monsoon, lack of budget and site possession. Also, five of them experienced the cost overrun and among them Risti khola bridge (Sotibesi) faced the highest cost overrun of 11.58% due to additional work and omission of quantity in original BOQ. Analysis of result shows that collective effort between all parties is required to reduce delay. Therefore, separate recommendations are provided to clients, consultants and contractors.

Keywords: Construction, overrun, project, mitigation, cost, quality, time.

Divine Echoes: Evaluating the Spiritual Sustainability of Tal Barahi Temple through its Built Environment.

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Abstract

This study investigates the spiritual sustainability of Tal Barahi Temple, located in Pokhara, Nepal, by analysing the interplay between its built environment and surrounding natural landscape. The research aims to: i) examines how the temple's architectural design, spatial layout, and natural setting contribute to its sacred character; ii) document visitor and devotee interactions with the spatial design through ethnographic observation; and iii) assess stakeholder perspectives, including those of priests, management committee members, devotees, and visitors, on spiritual practices, management challenges, and preservation needs. Employing a qualitative methodology, the study integrates a detailed analysis of the temple premises and its surroundings, ethnographic observations of daily rituals, special ceremonies, and communal activities, and in-depth interviews with key stakeholders to elucidate personal and collective spiritual experiences. Results indicate that the temple's-built environment, harmonized with its scenic natural surroundings, significantly enhances spiritual experiences. However, challenges

such as tourism pressures, environmental degradation, and urban encroachment pose significant threats to the site's spiritual integrity. The findings emphasize the critical need for strategic preservation efforts to strengthen the built environment, ensuring the long-term spiritual sustainability and cultural heritage of Taal Barahi Temple.

Keywords: Spiritual Sustainability, Tal Barahi Temple, Built Environment, ethnographic observation, stakeholder perspectives, urban encroachment.

The Application of Artificial Intelligence (AI) in Architectural Conceptual Design: A Critical Review

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Abstract

Conceptual design is a creative and iterative process in architecture that establishes a vision for the project. As in other fields, the introduction of AI is reshaping this process by introducing new tools that can enhance or even transform this foundational design stage. This review critically examines how AI is used in the conceptual design phase of architecture, evaluating its benefits, limitations, and implications for the design process. The research comprised analysis of peer-reviewed literature (2020-present). Selected sources were assessed based on methodology, application, design impact, and limitations. The research highlights significant AI use in early-stage design, particularly for generating alternative solutions, optimizing forms, and automating repetitive tasks. Key concerns include ethical oversight, algorithmic bias, diminished creative control, and integration challenges with traditional design. AI is emerging as a valuable tool in architectural conceptual design. It should be seen as a

supportive assistant rather than a replacement of designers. Future research should address ethical frameworks, practical implementation, and creative implication of AI in architecture.

Keywords: Artificial Intelligence (AI), Conceptual Design, Architecture, Creative Process, AI in architecture, Generative Design

Post-Construction Performance Monitoring and Maintenance of Community-Based Micro Hydropower Projects

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Abstract

This study presents an integrated evaluation of community-based micro-hydropower projects in rural Nepal, combining technical performance assessment, financial analysis, and community feedback. Critical performance indicators were systematically identified and validated using correlation analysis, household surveys, and weighted overlay techniques across seven project sites. The correlation analysis showed that Design Capacity (kW) and Energy Output (kW) were the most influential factors, each achieving high correlation values (0.649 and 0.648) and top weightages (0.106). Financial indicators such as Annual Income and Annual Repair Costs also proved vital for project sustainability. Based on prioritization, P003 (Sirdibaas Uhiya Mini Hydro) was ranked first with a priority score of 1.52, driven by high energy output, while P001 (Samagaun Micro Hydro) followed with a score of 0.12, due to strong operational efficiency. Household survey findings aligned with the technical analysis, where five projects (P001–P005) scored 3.8 out of 4.0 in community satisfaction,

indicating high reliability and affordability. Slightly lower scores for P006 (Chumling Chumchet Micro Hydro) and P007 (Chhekampar Micro Hydro) (3.5/4.0) suggest minor areas for improvement. Discrepancies, such as the overestimation of P005 (Dyang Rana Micro Hydro) performance by users, highlighted the importance of combining technical inspections with user feedback. Overall, this research illustrates the importance of integrating quantitative technical assessments with qualitative community feedback for effective post-construction performance monitoring. The developed prioritization model offers policymakers, development practitioners, and project managers critical insights to optimize maintenance strategies, allocate resources efficiently, and ensure the long-term sustainability of micro-hydro infrastructures in remote and underserved regions of Nepal.

Keywords: Prioritizing, Monitoring, Hydropower Projects, Correlation, Weighted Overlay, Household Surveys, Performance, Sustainability

Abstractive Summarization of News Articles Using BART

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Abstract

Abstractive text summarization focuses on generating concise summaries that preserve the major concepts of a document through newly generated sentences rather than pasting from the original. With rapid growth in online news content, efficient summarization systems are further necessary to facilitate efficient information processing by readers. Here, we apply the transformer-based encoder-decoder model BART-Large for abstractive summarization of news stories. The model is fine-tuned on two benchmark datasets: XSum, which focuses on extremely abstractive, single-sentence summaries, and CNN/Daily Mail, which asks for longer, multi-sentence summaries. These datasets pose different abstraction and length challenges, enabling us to test the flexibility of the model with varying summarization styles. Performance is measured with ROUGE metrics, which compare generated summaries against human-written references. The results show that BART-Large produces fluent and contextually meaningful summaries with strong performance on both datasets. The study

highlights the effectiveness of fine-tuning large pre-trained language models for domain-specific tasks and demonstrates their capacity to deal with different demands for summarization. Furthermore, it underscores out the potential of transformer-based models in real applications such as news aggregation websites, personalized information services, in which correct and concise content delivery is critical.

Keywords: Abstractive Text Summarization, BART-Large, News Articles, ROUGE Evaluation, Natural Language Processing

Leveraging AI and IoT for Transformative Quality Education 4.0: Opportunities and Challenges in Engineering Departments of Pashchimanchal Campus, Pokhara

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Abstract

The rapid evolution of Artificial Intelligence (AI) and the Internet of Things (IoT) has significantly transformed service sectors globally, with education emerging as one of the most positively impacted domains. Education 4.0, often referred to as the Fourth Industrial Revolution in education, integrates emerging technologies with pedagogical, andragogical, heutagogical, and cybergogical approaches to enhance teaching and learning. While developed nations have embraced this transformation by focusing on competencies, innovative learning methods, and robust ICT infrastructures, countries like Nepal, with limited resources, remain

on the periphery of this educational revolution. This study employs an interpretive research methodology, combining a rigorous literature review with an in-depth questionnaire survey conducted among key personnel and Campus Administrative Bodies (CAB) of Pashchimanchal Campus. The aim is to assess institutional readiness, identify infrastructural gaps, and uncover untapped opportunities for AI and IoT integration in Engineering education. Findings reveal that current education policies and their implementation fall short of addressing the transformative potential of Education 4.0. A lack of awareness and preparedness among management and educators hinders progress toward achieving Sustainable Development Goal (SDG4), which advocates for inclusive and equitable quality education. The research underscores the critical need to bridge the digital divide and modernize educational practices in Pashchimanchal Campus. By harnessing AI and IoT in classrooms, with flipped classroom model, educational organizations can foster lifelong learning, reduce socio-economic disparities, and empower individuals to tackle global challenges. The study offers actionable recommendations for policymakers, educators, and researchers of Institute of Engineering (IOE) to proactively leverage technology for educational advancement and societal betterment.

Keywords: Adaptive Learning; Education 4.0; Nepal Engineering Education; Educational Innovation; Artificial Intelligence (AI) in Education; SDG4 for Quality Education

Experimental Study of Behaviour of M20 Concrete by addition of Bamboo Fiber

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Abstract

Fibers are frequently added to concrete to increase overall strength and crack resistance. To get the required durability and mechanical qualities, different kinds of fibers are added to concrete mixtures. The use of natural fibers has recently drawn attention, especially in poorer nations, as worries about global warming and the need for sustainable building materials have grown. Bamboo, which is widely available, inexpensive, and grows quickly, has showed promise in seismic retrofitting and earthquake-resistant building. The mechanical behavior of concrete reinforced with bamboo fibers has been studied by researchers, and experimental findings indicate that bamboo fibers can be used to improve concrete performance. This study examines the workability, flexural strength, and compressive strength of M-20 concrete reinforced with varying percentages of bamboo fiber by cement weight. While LAA of coarse aggregate and moisture content, clay content, specific gravity, etc. of fine aggregates are conducted, the main research areas are slump, compressive, and flexural strength tests. The impact of bamboo fibers on the compressive and flexural

strengths of M20 concrete is investigated in this study. When 0.5% bamboo fiber is added, compressive strength increases somewhat during the first 28 days of curing. Adding 1% bamboo fiber improves the mix's flexural and compressive strengths, making it denser and more resilient. However, clumping and inadequate hydration cause performance to deteriorate and concrete becomes weaker as the fiber concentration surpasses 1%. The maximum flexural strength values obtained at this concentration indicate that 1% of bamboo fiber is the ideal amount to increase flexural strength.

Keywords: Bamboo Fiber, Compressive Strength, Flexural Strength

Adaptive Housing Across the Lifespan: A Systematic Review

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Abstract

The global rise in aging populations and differently abled individuals underscores the urgent need for housing that is both inclusive and adaptable. Beyond meeting functional standards of accessibility, housing must also respond to the embodied and emotional experiences of its inhabitants throughout the lifespan. This study investigates how domestic architecture can adapt to evolving bodily needs—from childhood through to aging and disability—by combining evidence-based design strategies with critical perspectives on embodiment and temporality. Using PRISMA guidelines, a systematic review of literature was conducted with Google Scholar. Keywords such as inclusive housing, universal design, aging in place, and disability-friendly housing guided the search. The expected outcome have four central themes: (1) universal and barrier-free principles that minimize environmental obstacles, (2) adaptable layouts and multifunctional spaces that provide long-term flexibility, (3) smart and assistive technologies that promote independence, and (4) user-centered approaches that incorporate the voices of older adults and differently

abled individuals. Comparative insights from “lifetime homes” and international case studies further illustrate strategies for designing environments that anticipate and accommodate change. The findings show that adaptive housing not only enhances accessibility and independence but also fosters dignity, wellbeing, and social inclusion. This research advances a framework for housing that evolves with its users, offering valuable implications for architects, policymakers, and urban planners seeking to embed flexibility and inclusivity in future housing practice.

Keywords: Inclusive housing, Adaptive design, Lifetime homes, Body in architecture, Aging in place, Disability-friendly housing, Smart homes

Design of a Hardware-Integrated OCR System for Devnagari Text in Nepalese Citzenships

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Abstract

In today's date, banks to government institutions, most forms still require users to fill in details on the paper and then retype them into a database. Essential documents such as citizenship cards, national identification cards, driving licenses, and passports are only available in physical form. To digitize such information, an Optical Character Recognition (OCR) system is required. OCR systems are the technologies that convert printed or handwritten text from the images into machine-readable format. A complete hardware-integrated machine learning framework is presented for automatically extracting Devanagari text from citizenship documents and storing it in a database without manual input. A document feeder mechanism equipped with a high-torque planetary gear motor was designed, in which the roller is rotated to replace documents from a stack and capture images sequentially. The captured image is processed using a YOLO-based model to detect the region of interest (ROI) of the

document, which is then passed to Tesseract OCR for converting the printed Devanagari details into machine-readable text. Experimental results show that our model achieves a Character Error Rate (CER) of less than 20% on previously unseen citizenship documents, showing the feasibility of our approach for large-scale document digitization.

Keywords: Character Error Rate (CER), Citizenship Document, Devanagari Script, Document Feeder Mechanism, Optical Character Recognition (OCR), Tesseract, YOLO.

Impact of On-the-Job Training of Village Maintenance Workers on Functionality of Water Supply Projects

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Abstract

The Nepalese water sector continues to face operational challenges, with an estimated 37% of rural water supply systems non-functional, largely due to a shortage of skilled human resources. While capacity building is recognized as vital for sustainability, limited empirical evidence exists on the long-term effectiveness of On-the-Job Training (OJT) for Village Maintenance Workers (VMWs). Existing studies often focus on technical interventions or community engagement, overlooking the role of real-time training in sustaining functionality. This study investigates the contribution of OJT to rural water supply system performance. Nineteen “1 House 1 Tap” projects, constructed between 2010 and 2020 in Dhankuta District by the Gurkha Welfare Trust Nepal, were evaluated using structured questionnaires, focus group discussions, telephone surveys, and field visits. Findings show that OJT substantially improves technical capacity, operational efficiency, maintenance skills, timely repairs, financial management, water safety, and institutional support, resulting in 89% of systems

being classified as “low risk for non-functionality.” Trained VMWs also fostered community ownership and cost-sharing practices. However, persistent challenges included record-keeping, spare parts management, PPE provision, and training material suitability. Most systems were in good maintenance condition (57.8%), 21.1% required minor repairs, and some in disaster-prone areas faced major issues due to infrastructure damage and water shortages. The study highlights the critical role of human capacity and training quality in sustaining rural water supply systems, contributing new insights into how capacity-building initiatives influence WASH functionality in Nepal’s rural context.

Keywords: Capacity building, Village Maintenance Workers, Functionality.

Effect of Post Earthquake rural housing reconstruction on housing types and family debt

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Abstract

On average, the house size in Nepal has decreased from pre- to post-earthquake. Due to time-bound, limited scope of resources and financial capacity of people, especially rural reconstruction has witnessed a trend of building small compared to pre-disaster situation. The following research investigates the change analysis in terms of house size, living area and change in construction materials and typology choices and concludes that the changes do not meet the households' spatial needs. The research investigates the household debt status and portrays out results of increase in debt status due to post disaster recovery process. The main objective of this research is to analyze the change in house size, typologies and debt status of newly rebuild houses and families located in earthquake affected areas and relevance of central place theory in housing reconstruction planning process. The quantitative method was applied with collection of households level data by random sampling and supported with secondary information collected through literature review, report and evidence available from various projects. The study assessed the investment in housing reconstruction where the average house

reconstruction cost is very high compared to the reconstruction grant provided by government. The housing reconstruction without settlement consideration is incomplete considering the integrated recovery or development framework. The settlement approach lens is required at micro level when we do trend analysis of the unit as house. The rural reconstruction may benefit and contribute to sustainable development process if a reconstruction model is formulated based on application of Central Place Theory. The research contributes to evidence generation that is useful for formulation of effective policies and strategies to be incorporated in the ongoing or future rural housing reconstruction program inside and outside of Nepal.

Keywords: housing reconstruction, housing trend, recovery, housing finance, lessons learned

Building Typologies in a Vernacular Street of Dhampus, Nepal

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Abstract

This study documents and analyzes building typologies in a vernacular street of Dhampus, a Gurung settlement in Nepal's Annapurna region, where century-old houses continue to define the village character. Field surveys, measured drawings, and photographic documentation were carried out to examine four representative houses along the street. The findings reveal a striking uniformity in plan configuration, elevation, section, and construction materials, reflecting the endurance of cultural and climatic building traditions. The only notable variations were observed in the treatment of porches, which adapt to the alignment and slope of the street, producing subtle differences in rhythm and social use. These variations, though minimal, play a key role in shaping the street's collective identity and sense of place. The research highlights how typological continuity and controlled variation sustain the heritage character of traditional settlements and offers insights for context-sensitive preservation strategies in rural Nepal.

Keywords: Building Typology, Climate-Responsive Design, Street Character, Vernacular Architecture.

2D Numerical Simulation of Sediment Flushing in Hydropower Simulation

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Abstract

Sedimentation in reservoir is most common problem in today's context which contribute to decrease the hydropower reservoir capacity. Reservoir flushing is one of the methods for extending the life period of reservoir. During flood flow, velocity is increased by drawing down the water level which helps in sediment transport by erosion and deposition. Different parameters like discharge, sediment size, reservoir bathymetry plays vital role on the effectiveness of reservoir flushing. This study presents the application of Computational Fluid Dynamics (CFD) to predict the reservoir flushing process through erosion and deposition pattern. A two-dimensional numerical model (REEF3D: SFLOW) with immersed boundary condition for grid, wetting and drying algorithm, free water surface and numerical modelling of sediment movement can be used for flushing optimization and planning for complex reservoir geometries. The numerical model was tested against data from physical model study of Binga Hydroelectric Power Plant Reservoir in Norsk Hydroteknisk Laboratorium, Norwegian University of Science and Technology. The time development of scouring and deposition pattern in different

section were studied and the study indicates that numerical modelling can be a useful tool for predication of reservoir flushing.

Keywords: Numerical simulation; Sedimentation; Reservoir flushing; Drawdown;

An economic analysis of grid tied solar hybrid power system compared to grid tied diesel hybrid power system at School of Engineering, Block B, Pokhara University

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Abstract

The projects present an economic analysis of grid tied solar hybrid power system compared to grid tied diesel hybrid power system at School of Engineering, Block B, Pokhara University, Lekhnath, Nepal. Three systems i.e. grid tied solar with battery, grid tied solar without battery and grid tied diesel generator hybrid power system are simulated using HOMER software. The grid-tied solar hybrid system without battery storage is identified as the most economical option, benefiting from lower initial costs and maintenance requirements due to the absence of batteries. The solar hybrid system with batteries, while providing greater energy independence, incurs higher costs due to battery installation and maintenance. The diesel generator hybrid system, although less expensive initially than the solar-battery hybrid, proves more costly in the long run due to fuel consumption and maintenance expenses. This project concludes that the grid-tied solar hybrid system without battery storage offers the best economic

performance for Pokhara University, considering the local solar irradiance, reliable grid access, and the University's energy needs.

Keywords: grid-tied solar hybrid system, batteries, reliable grid access

Influences of the natural environment on the traditional settlement pattern: A study on the growth of Tangting Village, Nepal

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Abstract

The natural environment plays a significant role in the development of the settlement pattern. In most cases, houses in the hilly regions are seen to be on the southern slope to get the maximum sunlight. This study focuses on the rural settlement pattern of Tangting village, located in Madi Rural Municipality, Kaski, Nepal. This research explores the influencing factors that guide the growth of a traditional village on the northern slope of the hills. For this research, around 200 households of Tangting villages are studied as part of the Bachelor of Architecture Design VI course, semester IX, under the Pokhara University curriculum. Descriptive research strategies are used in this paper, where a group of 21 students was involved to carry out a household and building survey in Tangting village. The lifestyle and orientation of houses are determined through building surveys and household surveys. As per data collected from a survey in 2023, it is found that more than 80% of households depend on agriculture and farmland for survival. The houses are built near their farmland for easy access to everyday activities. One of the factors

that Tangting village is situated on a northern slope is due to its topography and the agrarian lifestyle of its inhabitants.

Keywords: Tangting village, natural environment, traditional settlement, spatial pattern, farmland

A Mobile Application to track Public Vehicle and suggest passengers Vehicle to reach their destination in Pokhara Metropolitan City

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Abstract

Pokhara Sarathi is a mobile application that suggest public vehicle bus routes to passengers by tracking real time GPS location of public vehicles in Pokhara Metropolitan City. This application shows time at which bus will be available to passengers from the location the passengers have logged in into the application, changes in bus routes that needs to be done by passengers to reach their destination and tentative time at which visitors will reach their destination. This application also provides total bus fare that passengers will have to pay to each bus they commute with as per standard fare rate approved by Ministry of Physical Infrastructure and Transport, Nepal protecting passengers from being charged higher fare rate by public transport operator. This application contributes to making public vehicle transport more reliable increasing public vehicle user in Pokhara Metropolitan City.

Keywords: GPS location, public transport operator, public transport operator

A study on Soil-Cement Bricks with addition of Thatch

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Abstract

This paper presents the evaluation of compressive strength of soil-cement bricks obtained by addition of thatch in the mixture. This study was conducted to evaluate the behavior of soil cement brick stabilized with thatch to check the visibility of using thatch as reinforcement for brick fabrication. Various percentage of soils (75%,80%,85%) was mixed with constant percentage of cement (10%), sand (25%, 10%, 5%) and thatch (0%,0.25%, 0.50%, 0.75%, 1%) by weight of soil. Bricks were compressed by mechanical means which reduces air pollution and dried in open air. The test results indicated that thatch additive improves compressive strength with decrease in percentage of soil in addition to water absorption increases. The results show that compressive strength was in the range of IS Code at 28 days of curing and water absorption were near to recommended values. Manufacturing cost were also determined for this brick comparing with cost of other type bricks.

Keywords: Soil- cement bricks, thatch, compressive strength, water absorption, cost.

Selection of CMIP6 climate models and future climatic projection in Gandaki River basin, Nepal

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Abstract

Representative general circulation models (GCMs) for a given region is crucial for accurate hydrological projections, water resource planning, flood risk assessment, and hydropower sustainability. A representative GCMs for Gandaki River Basin was identified using an advance envelope-based and finally bias-corrected using quantile mapping. Four representative model under CMIP6's SSP 2-4.5 and SSP 2-4.5 scenarios project changes in precipitation and temperature. Under SSP 2-4.5, bias-corrected precipitation is expected to vary from -3.58 to 38.12%, 2.69 to 36.83%, and 7.53 to 48.26% during the Near Future, Mid Future, and Far Future periods, respectively. In contrast, for SSP 5-8.5 scenario forecasts increase from -1.25 to 20.94%, 0.90 to 44.67%, and 7.52 to 83.12% for same periods. Also, temperature projections under SSP 2-4.5 predict a rise of 0.57 to 1.28°C, 1.07 to 2.22°C, and 1.45 to 2.49°C during NF, MF, and FF, respectively. Conversely, SSP 5-8.5 anticipates increases of 0.45 to 1.34°C, 1.36 to 3.11°C, and 2.11 to 5.41°C in these same periods. Generally, more precipitation and an increase in temperature is expected under SSP 5-8.5 scenario than SSP2-4.5. Moreover, incorporating GCM-based

climate projections into decision-making allows adaptive management strategies, which ensure resilience against future climate variability and secures water availability for hydropower's.

Keywords: general circulation models (GCMs), climate projections, flood risk assessment,

Geological Mapping, Geohazard Assessment, and Construction Material Survey around Prithvi Narayan Campus, Pokhara, Nepal

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Abstract

This research presents a detailed geological and geomorphological study of the area surrounding Prithvi Narayan Campus in Pokhara, Nepal an urban region located within the tectonically active central Himalaya. The investigation aimed not only to understand the local geology and hazard susceptibility but also to assess the availability of minerals and construction materials critical for regional development. Field mapping and lithostratigraphic analysis revealed that the area is predominantly composed of fluvioglacial and alluvial deposits from the Pokhara Formation, featuring gravel, conglomerate, clay, and fine sediments. The terrain is rich in clasts of quartzite, schist, limestone, and phyllite pointing to contributions from upstream metamorphic terrains. Economically valuable minerals such as tourmaline, garnet, kyanite, and quartz were also identified in sedimentary contexts. In terms of hazard assessment, the region exhibits notable signs of karst development, including sinkholes, dissolution joints, and riverbank erosion, especially along

carbonate-rich zones. Evidence of slope instability, debris flows, and seasonal stream incision suggests heightened risk during monsoon conditions posing challenges for infrastructure like roads, retaining walls, and foundations. The study also evaluated the local potential of construction materials such as sand, gravel, and boulders identifying quality variations and recommending proper management to avoid overextraction and ecological degradation. Overall, this research emphasizes the essential role of engineering geology in hazard mitigation, land-use planning, and sustainable infrastructure development in mountainous regions.

Keywords: Active central Himalaya, lithostratigraphic analysis, Field mapping

Seismic Resilience in the Himalayas: Vernacular Timber–Stone Construction of Tsum Valley, Nepal

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Abstract

The vernacular architecture of Nepal’s central Himalayan region embodies generations of seismic resilience, refined through locally available materials and proportion-based design. In Tsum Valley, knowledge of earthquake-resistant construction—featuring the “nang che” timber box frame integrated with “tsig pa” dry stone masonry—has been transmitted through oral tradition and practice. This independent timber frame absorbs seismic shocks, prevents wall collapse into interiors, and enables repairs without dismantling the structure. Additional features such as interlocked stone bonding, limited openings, and low height to length ratios enhance stability. Recent decades have seen a decline in these methods due to external construction practices, resulting in poor earthquake performance, as seen in the 2015 Gorkha Earthquake. Post-disaster reconstruction has confirmed that when skilled local masons apply traditional methods, buildings outperform poorly adapted modern systems. Integrating indigenous techniques into current construction policies offers a

sustainable, cost-effective solution for rural Nepal, combining cultural heritage preservation with disaster risk reduction.

Keywords: Vernacular architecture, seismic resilience, Tsum Valley, timber box frame, dry stone masonry, Nepal.

Comparative Study of Behaviour of Buildings using NBC 105:2020 and IS 1893:2016 based on Horizontal Irregularities

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Abstract

Seismic performance of structures is highly influenced by building configuration and the design code adopted. Irregular buildings, especially those with L-, U-, and E-shaped plans, are known to exhibit complex dynamic behavior compared to regular-shaped structures. This study focuses on evaluating the seismic response of such irregular configurations using two widely adopted design standards: NBC 105:2020 (Nepal) and IS 1893:2016 (India). A comparative analysis was conducted through equivalent static method using ETABS software, assessing key parameters such as lateral displacement, inter-storey drift, and torsional irregularity. Four different building models—regular, L-shaped, U-shaped, and E-shaped—were analyzed under identical loading, material, and geometric conditions. The results revealed that irregular buildings consistently exhibited higher lateral displacement and drift, particularly at the re-entrant corners where stress concentrations were

most severe. Among the codes, NBC 105:2020 produced notably higher drift values in all configurations compared to IS 1893:2016, indicating a more conservative approach. Torsional irregularities were also more pronounced in L- and U-shaped buildings under NBC, due to its stricter consideration of eccentricity and mass irregularity. Overall, the study highlights the critical impact of both structural configuration and seismic code selection on the response of buildings. It is concluded that while NBC 105:2020 provides a higher margin of safety, especially for irregular buildings, careful consideration of building geometry during the design phase remains essential for seismic resilience. The findings underscore the need for enhanced code-specific design provisions for irregular structures in high-seismic zones.

Keywords: Code comparison, horizontal irregularities, apartment buildings, base shear, drift, torsion, displacement, Seismic coefficient

Emotion Aware System: CNN Based Facial Expression Recognition

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Abstract

Emotion recognition has become an essential task in affective computing, human computer interaction, and mental health applications. Convolutional Neural Networks (CNNs) have shown remarkable success in image-based classification tasks due to their ability to automatically learn hierarchical spatial features. In this work, we apply CNN based architecture for robust facial emotion detection. The proposed method extracts discriminative local and global features from facial images, enabling effective classification across multiple emotional states. We evaluate the model on benchmark facial emotion datasets, achieving improved accuracy compared to traditional machine learning methods that rely on handcrafted features. Results demonstrate that CNNs not only capture subtle variations in facial expressions but also provide scalability and adaptability to diverse datasets. This study highlights the effectiveness of CNN based approaches in emotion recognition, providing a strong foundation for building intelligent, emotion aware system.

Keywords: Emotion Recognition, Convolutional Neural Networks (CNN), Deep Learning, Facial Expression Analysis.

Multi-Stakeholder perspective on Internship in architectural education: A Case of Chitwan Engineering Campus

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Abstract

Internship (Practicum) offers practical, real experience that connect five-year academic course in architectural education. The main aim of the research is to investigate and evaluate the effectiveness of practicum by analyzing opinions, performance, positive aspects, and challenges faced by both student and supervisors. It also aims to improve the practicum structure, guidelines and to identify the gap between academic learning and profession practice at Chitwan Engineering Campus. A mixed method approach was used for data collection from both students and supervisors (firms/mentors). Data were collected from 74 students using purposive sampling, semi structured interviews and focus group discussions with supervisors, review of reports submitted by student, and evaluation forms. The research analyses student's perspectives, the majority reported gaining valuable exposure to real work and improving their software skills (AutoCAD, Sketch Up, Revit etc). Additionally ,75% of the student identified a gap between the theoretical knowledge taught at the campus and practical application in the field. Only 30% of student

received consistent guidance from firm supervisors and 45% supervisors appreciated the student's skills and practical knowledge of drawings. 85% of student strongly believed that the current evaluation techniques, including assessments by firms and supervisors, are not fair or justified. At Chitwan Engineering Campus (CEC), the overlapping involvement of the same individuals as firm representatives, supervisors, and student evaluators within the practicum structure has resulted in misguidance and misuse, ultimately compromising the core objectives of the Practicum.

Keywords: Practicum, Theory practice gap, student performance, Overlapping role, Guideline

Assessment of Supply Chain of A-Class Construction Materials of Public Building Construction Project in Lamjung District

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Abstract

Construction materials usually constitute a major portion of the total cost in building construction project. An essential factor adversely affecting the performance of construction projects is the improper handling of materials during site activities. The aim of this thesis is to assess the supply Chain of A-Class Construction Materials of Public Building Construction Project in Lamjung district by the use of structured questionnaires administered to construction professional personnel of the project to assess the supply chain. The focus was on assessing the supply chain of A-class materials. Based on ABC analysis cement, brick, rebar, sand, stone and aggregate falls into that group. The field data collection involved surveying 36 respondents to determine A-class construction materials in public building in Lamjung district and also analyzed the supply chain, management practices, challenges and measures for material management. The literature review analyzed published research articles to gather information on the assessment of A-class construction materials. This

research assesses the need and importance of supply chain management on selected public building construction projects, identify and analyze the current practices and challenges in the supply chain management process. The study subjects are currently active public projects in Lamjung District which are being administered by Urban municipalities, Rural Municipalities of Lamjung District and Department of Urban Development and Building Construction (DUDBC). The main tools used for the collection of data included questionnaires and desk study as they are used to identify the various efforts that have been made in the past and to examine the challenges of supply chain management. Frequency analysis and relative importance index (RII) are used to examine the results from the questionnaire and findings are presented in charts and tables.

Keywords: ABC Analysis, Relative Importance Index (RII), Supply chain management, Construction Materials

Analysis of the Impact of Goat Hair as Fiber on the Compressive and Flexural Strength of M-20 Concrete

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Abstract

This research examines the influence of goat hair fibers on the physical and mechanical properties of M-20 concrete, specifically focusing on its compressive and flexural strength at various fiber ratios. Concrete is a fundamental material in the construction sector; however, its durability and strength often face limitations. In response, recent studies have investigated the incorporation of sustainable alternatives, such as natural fibers, to improve concrete performance. Goat hair fibers, known for their light weight, high tensile strength, and eco-friendly characteristics, have emerged as a promising reinforcement material. This study evaluates the effects of adding goat hair fibers (GHF) with different aspect ratios (140 and 70) and varying fiber contents (0.5%, 1%, 1.5%, and 2%) to concrete, utilizing both mechanical and chemical extraction methods. The compressive strength tests reveal that the inclusion of 0.5% GHF boosts the concrete's strength, with the maximum compressive strength occurring at 1% GHF. However, beyond 1%, further fiber content reduction leads to a marked decrease in strength, attributed to poor

bonding and reduced workability, particularly with aspect ratio 140 fibers. Similarly, flexural strength tests show improvements up to 1% GHF content, with aspect ratio 140 fibers providing slightly better performance than aspect ratio 70 fibers. At fiber contents greater than 1.5%, the flexural strength drops, indicating the negative effects of excessive fiber content on the concrete's structural integrity. In conclusion, goat hair fiber reinforcement enhances the compressive and flexural strength of M-20 concrete when used within optimal fiber contents (0.5% to 1%) and aspect ratio (140). Excessive fiber amounts and poor fiber dispersion negatively affect mechanical performance, underscoring the need for careful fiber dosage optimization. This study provides valuable insights into the potential of using goat hair fibers as a sustainable reinforcement material for concrete, with promising applications in improving the strength and durability of concrete structures.

Keywords: fiber content, physical, mechanical properties,

Towards Explainable AI in Healthcare: Machine Learning Based Diabetes Prediction with LIME

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Abstract

Diabetes is a chronic, common and severe non-communicable disease that impacts millions people globally. The increasing prevalence and widespread presence of diabetes needs precise and timely diagnosis to prevent serious complication. With its high accuracy and efficiency number of researchers have implemented Machine Learning (ML) to predict diabetes. Although early diagnosis has been achieved by these studies, the majority of ML models operates as “black boxes”. Which makes it challenging in the critical domain like healthcare so that it is very difficult for medical professionals to realize the decision making process. In order to improve interpretability, this research article incorporates Local Interpretable Model-agnostic Explanations (LIME) into a framework for diabetes prediction implementing various machine learning models. A publicly available dataset of 100,000 cases with nine distinct features and binary classifications (diabetes and non-diabetes) were utilized for this investigation. A variety of data preprocessing steps were carried out prior to model implementation, including the hybrid Synthetic Minority Oversampling Technique (SMOTE) & Tomek to handle the class

unbalanced problem. The study evaluates models such as Logistic Regression (LR), Support Vector Machine (SVM), Decision Tree (DT), Random Forest (RF), Naïve Bayes (NB), K-Nearest Neighbor (KNN) classifier using performance matrix like accuracy, precision, recall, F1 –score and AUC-ROC. The key contribution of this work lies in combining advanced class imbalance handling (SMOTE-TOMEK) with local explainable AI (LIME), applied to a large real-world diabetes dataset. This framework enables both accurate and clinically interpretable predictions, addressing a critical gap in trustworthy AI for healthcare. The result indicates that RF and DT models outperform with the prediction accuracy 97.9% and 97% respectively while Explainable Artificial Intelligence (XAI) technique LIME successfully explains glucose level and BMI were the most influential predictors. The findings of this study indicate that integrating Machine Learning with XAI presents an encouraging approach for developing truthful and interpretable tools tailored for healthcare applications.

Keywords: Diabetes Prediction, Healthcare, Machine Learning, SMOTE, TOMEK, Random Forest, XAI, LIME

An Experimental Study on the Discrepancies in Mechanical Properties of Concrete Between Laboratory Mixes and In-situ Cast Specimens

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Abstract

In concrete construction, achieving the specified grade strength requires accounting for variability in mix and execution; IS 456:2000 reaffirmed 2021 prescribes a design standard deviation of four plus one MPa for M25 grade concrete, but actual field variability may differ. This study therefore evaluates the adequacy of the IS 456:2000 's standard deviation (SD) provision and compares field-produced versus controlled laboratory concrete for M25 grade produced using locally available material and casting practices being used in Nepal. Thirty-two field-cast concrete cube specimens (Secondary data); four cubes from each eight different project were collected and Standard 28-day compressive strength tested at the Pokhara Engineering college lab and compared the results with the same number of laboratory mix-design specimens (Primary data) test results for M25 concrete. The field samples averaged only 27.62 MPa with a standard deviation of 4.74 MPa (coefficient of variation $\approx 17.15\%$). In contrast, the laboratory mixture samples averaged 30.61 MPa with a much

lower standard deviation of 1.38 MPa ($CV \approx 4.52\%$). Despite the hardened density of field cast concrete ($=2499.78 \text{ kg/m}^3$) was higher than the lab density ($=2484.54 \text{ kg/m}^3$), the lab-controlled concrete exhibited both higher mean strength and far firmer quality control than the field concrete. Though, the observed field SD falls within the code nominal (5 MPa) value, 25% of the individual cube result fails to satisfy the minimum criteria for individual cubes as per IS 456. Similarly, the non-destructive tests, viz; Schmidt hammer test and ultrasonic pulse velocity test were also conducted to the project site. The results of non-destructive tests have shown that the field concrete were cast satisfactorily. These results imply that field concrete often fails to meet the design criteria of 25 MPa. The study concludes that poor site practices of casting the cube specimen like neglecting proper batching, compaction, curing and handling the cubes lead to understrength concrete. In summary, laboratory-produced concrete demonstrated better quality control, whereas many field samples failed acceptance criteria; improvements in field supervision and codal compliance are therefore advised.

Keywords: Mechanical properties, Hardened density, NDT, Site practices

Shift towards Eco-friendly and High-Performance Chemical Admixture in concrete: A case study of Nepal.

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Abstract

The global cement industry is contending with escalating environmental challenges, primarily due to surging CO₂ emissions from production, which are projected to double by 2050 amid rising demand in emerging economies like Nepal. The growing demand for sustainable construction practices has necessitated the demand for more eco-friendly and high-performance alternatives in concrete production. In Nepal, where construction is rapidly expanding, the use of chemical admixtures is becoming more common among the stakeholders primarily for reducing cost of concrete production as well as for enhancing workability, and strength. However, durability properties of concrete have got lesser importance. The market practice has shown that adoption of admixtures doses is either based on trial and error or simply on specified doses ranges prescribed by the admixture seller rather than systematic laboratory-based mix design. Based on literature, polycarboxylate ether (PCE)-based superplasticizers do not have compatible issues in general and can reduce CO₂ emissions by facilitating 20–30% cement reduction. But

in context of Nepal, some issues have been observed based on field observations like slump retention, setting time problem etc. So, this study was conducted to evaluate the compatibility issues among the PCE based admixtures available in local market and ordinary Portland cement manufactured in Nepal. The study assesses compatibility between five PCE variants and four locally sourced Ordinary Portland Cements (OPC) across water to-cement (w/c) ratios of 0.40–0.55. Marsh cone test had been adopted to evaluate the issues. Most of the combinations seem incompatible, however there was evidence of increase in workability of 20-40% and compressive strength up to 40%. The optimal doses (0.4 to 0.7%) seem far below based on literature reviews and as prescribed by the vender. So, the study concluded that growing practice of using chemical admixtures is good indication towards sustainability, however there is need of extensive lab-based workout for the effective use of chemicals and awareness and training among the stakeholders to avoid misuse or overdosing.

Keywords: Eco-friendly, stakeholders, polycarboxylate ether (PCE), compatible

Enhanced efficiency in dual-stage grid-connected photovoltaic systems with PSO-integrated hybrid MPPT techniques

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Abstract

The maximum power point tracking (MPPT) technique facilitates the extraction of peak output power from photovoltaic (PV) systems using various optimization algorithms. Conventional perturb-and-observe (P&O) and incremental conductance (INC) techniques are commonly used to enhance peak power in PV systems but suffer from limitations like slow convergence and oscillations near the maximum power point (MPP). This study incorporated a hybrid approach integrating particle swarm optimization (PSO) with conventional perturb and observe and incremental conductance methods to optimize the maximum power point. This hybrid approach dynamically adjusts the step size in response to solar irradiance and temperature fluctuations in a dual-stage grid-connected photovoltaic (PV) system. The results demonstrated that integrating PSO with traditional P&O and INC methods improved efficiency, with the PSO-INC combination achieving superior performance (95.23%) compared to PSO-P&O

(90%). Additionally, both hybrid approaches demonstrated enhanced performance in terms of reduced oscillations and power levels from the DC-DC boost converter. The findings of this study provide valuable insights and recommendations for optimizing PV system efficiency and promoting sustainable energy solutions.

Keywords: Particle swarm optimization, solar irradiance, perturb and observe, incremental conductance, dual-stage grid, PV system.

Performance Assessment Using Key Performance Indicators for Shivalaya Water Supply Project

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Abstract

This research assesses the performance of the Shivalaya Water Supply Project using nineteen key performance indicators (KPIs) categorized into two broad dimensions: (i) service delivery, which evaluates the extent, quality, and level of water supply services, and (ii) operational and management efficiency, which examines the performance of the service provider. Together, these indicators cover technical, financial, commercial, consumer satisfaction, and organizational aspects of water service provision. The findings demonstrate that service coverage and sufficiency are generally satisfactory, with most households receiving adequate water supply. Water quality is reported to be high under normal conditions, though minor contamination issues arise during rainy periods. Accessibility is favourable, yet the continuity and reliability of the service remain critical challenges requiring immediate attention. From a technical perspective, the project exhibits strong asset management practices and effective maintenance capability, ensuring timely repairs and reducing service disruptions. However, the proportion of non-revenue water is

significantly high, indicating inefficiencies that undermine overall system performance. Financial management is a major strength of the project, reflected in efficient resource allocation, transparent accounting, and effective control of operating expenses. Similarly, commercial operations are well-developed, with accurate metering, streamlined billing and collection processes, and well-maintained customer databases. Despite these strengths, consumer satisfaction results are mixed. While complaints are managed effectively, overall satisfaction levels are relatively low, highlighting the need for greater focus on customer service and communication. Organizational management emerges as a notable weakness, particularly in the formulation and execution of business plans and strategic initiatives. The study concludes that while the Shivalaya Water Supply Project demonstrates commendable strengths in technical, financial, and commercial operations, improvements are urgently required in reducing non-revenue water, enhancing service continuity, and strengthening organizational planning and consumer engagement to ensure long-term sustainability.

Keywords: Water Service Performance, Key Performance

Indicators, Community Management Mode, Shivalaya Water Supply Project.

Abstracts of Posters

“Women Wellness Center”: A Healing Environment For Women

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Abstract

The Women’s Wellness Centre is envisioned as a holistic, safe, and supportive environment dedicated to addressing women’s health across all stages of life. Recognizing the unique challenges from adolescence through menopause and beyond, the centre integrates medical care, mental health services, preventive healthcare, and wellness practices into a comprehensive model of care. It will provide a wide range of services, including reproductive health support, fitness programs, stress management, and counseling, while ensuring privacy, comfort, and accessibility. Guided by biophilic design principles, the centre incorporates natural light, greenery, water features, and eco-friendly materials to foster relaxation, reduce stress, and enhance healing. By combining modern healthcare with complementary therapies, the Women’s Wellness Centre seeks to empower women in a nurturing, community-centered setting. Ultimately, it aims to promote self-care, emotional resilience, and overall well-being, serving as a sanctuary for women of all ages.

Keywords: Women’s health, Holistic care, Preventive healthcare, Biophilic design

The Pawtral: Architecture for Canine Rehabilitation Center

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Abstract

The Pawtral: Architecture for Canine Rehabilitation Center is envisioned as a compassionate sanctuary dedicated to the rescue, rehabilitation, and reintegration of abused, abandoned, and neglected dogs in Nepal. In response to the alarming rise in cases of animal cruelty, the project aspires to create a humane and interactive environment where trust between humans and canines can be rebuilt. The center provides comprehensive care facilities, including medical treatment, behavioral therapy, adoption support, and public awareness programs, addressing both the physical and emotional well-being of rescued animals. Designed with empathy as its foundation, the project emphasizes barrier-free circulation, ensuring accessibility for visitors and staff while enhancing the healing journey for dogs.

Situated on a sloping terrain, the architecture embraces the natural landscape through earth berm integration, blending the built environment seamlessly into its surroundings. This approach not only reduces visual impact but also enhances thermal comfort,

sustainability, and ecological sensitivity. Ultimately, Pawtral functions as both a rehabilitation center and an educational platform, fostering awareness, responsibility, and coexistence between humans and animals.

Keywords: Adoption and Awareness, Animal Welfare, Canine Rehabilitation, , Empathy in Architecture, Sustainable Design.

Preservation of Linguistic Heritage: Museum of Language and Script

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Abstract

Language is the vessel of culture, memory, and identity, yet many of Nepal's native tongues and scripts are fading into silence. Despite Nepal's rich linguistic diversity, many indigenous languages and scripts are rapidly declining and facing extinction. While efforts have been made to document these languages, there is a lack of physical spaces dedicated to the promotion, preservation and education of these languages. There is an urgent need for dedicated space that not only preserves linguistic heritage but also fosters public education and renewed interest in Nepal's diverse languages. The study explores the role of architecture in preserving linguistic heritage through spatial design and material expression along with analyzing the challenges for the preservation and promotion of linguistic diversity throughout the time. The study envisions a Museum of Script and Language in Nepal dedicated to the preservation, promotion, and celebration of the nation's diverse linguistic heritage. Language, an abstract subject, is transformed into a multisensory experience; something to be heard, seen, and spoken. Exhibition spaces, archives, and research facilities

are arranged in a zig-zag form that follows the site's contours, inspired by the strokes and fluidity of scripts. The architecture becomes a metaphor for linguistic expression, immersing visitors in Nepal's living history while fostering awareness, interaction, and preservation through an engaging cultural journey.

Keywords: Heritage, Language, Script, Museum,

The Natak Spectrum: A Hub for All Dramatic Expressions

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Abstract

The Natak Spectrum is envisioned as a vibrant cultural hub in Pokhara, uniting people, stories, and traditions while embracing modern theatrical expressions. The study explores the idea of creating a drama hub in Pokhara that reflects the city's rich cultural heritage while welcoming the energy of modern theatrical forms. The research began with a simple question: can the existing Pokhara Theatre truly meet the growing demand and aspirations of its artists, audiences, and community? Through literature reviews, case studies, site visits, and conversations with stakeholders, the study uncovered the urgent need for a better-equipped, more versatile, and inspiring space for dramatic arts. The proposed design responds to this need with a blend of tradition and innovation. It offers a variety of spaces an auditorium, black box theatre, open amphitheater, and areas for training and cultural exchange all carefully shaped to enhance the experience of both performers and audiences. Rooted in the philosophies of minimalism, brutalism, and contextual sensitivity, the design aims to create an inclusive and memorable environment that feels authentic to

Pokhara's identity. Ultimately, The Natak Spectrum seeks to become a landmark where heritage and contemporary vision intersect nurturing creativity, preserving Nepal's theatrical traditions, and fostering a dynamic, evolving dramatic community.

Keywords: Theatre, Drama, Brutalism, Training, Inclusive

Women's Hospital (Healing hearts, Growing families)

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Abstract

Healthcare facilities play a crucial role in improving maternal and women's health, particularly in regions where specialized medical care is limited. This thesis explores the design and development of a Women's Hospital in Pokhara with a focus on providing a healing environment that integrates functionality, sustainability, and cultural sensitivity. The study emphasizes user-centric architectural planning to address the unique healthcare needs of women, including maternity, gynecological, infertility and general wellness services. Through an in-depth analysis of site conditions, vernacular architecture, and modern healthcare design principles, the project proposes a facility that harmonizes with the local landscape while ensuring efficiency and comfort. The design adopted an H-shaped plan to prioritize functionality through passive design strategies. This configuration inherently created two central courtyards, improving spatial organization, ensuring natural daylight penetration, and promoting cross-ventilation throughout clinical and public zones. These courtyards doubled as healing gardens, contributing to patient

recovery by fostering a calming environment. By integrating medical excellence with a healing environment, the facility not only ensures accessibility to quality treatment but also empowers women through care, dignity, and support. Its functionality extends beyond treatment to prevention, education, and community well-being, making it a vital contribution to the healthcare infrastructure of Pokhara.

Keywords: Healthcare, women, functionality, healing environment

Social Development Center at Aandhikhola

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Abstract

A social development center is a community focussed facility designed to address the diverse socio-economic needs of local populations which serve as a vital hubs for education, skill development, social engagement and economic development. Aandhikhola has limited access to healthcare and education because of poor roads along with limited economic opportunities, due to traditional farming methods and lack of access to markets. Addressing the challenges faced is essential for ensuring the long term sustainability and well-being of the community. The social development center in Aandhikhola, Syangja, is envisioned as a hub where tradition meets opportunity. Designed to address youth migration, limited jobs, and a lack of community facilities, it offers spaces for learning, skill-building, and engagement. Inspired by the terraced settlements of the region, the layout follows the land's contours, blending with its natural surroundings. Locally sourced stone and timber reduce costs and celebrate craftsmanship. Inside, workshops for bamboo, thread, metal, and tailoring sit alongside

exhibition and market areas where local products can shine. A volleyball court and community courtyard bring people together. By uniting vernacular wisdom with modern needs, the center aims to spark livelihoods, preserve heritage, and strengthen community bonds.

Keywords: Social Development, Community, Flexible Spaces, Local Materials

Gandaki Province Assembly Building an Architectural Reflection of Democracy

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Abstract

The Gandaki Province Assembly Building stands as a symbol of democratic governance and regional identity within Nepal's federal system. This research explores the architectural design, spatial planning, and socio-cultural integration of the assembly building, emphasizing its role in representing the political aspirations and cultural heritage of the Gandaki Province. The proposed design investigates how the design embodies principles of functionality, inclusivity, and sustainability. The research also examines the spaces surrounding the assembly building, highlighting their importance in facilitating civic engagement, environmental harmony, and symbolic openness in governance. Through a combination of architectural analysis, site evaluation, and stakeholder input, this study aims to present a comprehensive design philosophy that not only fulfils legislative requirements but also serves as a landmark of unity and progress for Gandaki Province.

Keywords: Civic Engagement, Democratic Architecture, Inclusivity in Design, Regional Identity, Sustainable Architecture.

Community Multi-sport Complex in Kawasoti

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Abstract

The thesis project, Community Multi-Sport Complex in Kawasoti, is envisioned as a vibrant hub for youth engagement, athletic development, and community interaction. Adopting a holistic approach to architectural and spatial design, the project aims to create an inclusive, multifunctional space that fosters the physical, mental, and social well-being of the community—placing particular emphasis on the needs and aspirations of young people. The design focuses on climate-responsive strategies, universal accessibility, and smart programmatic zoning, integrating both indoor and outdoor sports facilities tailored to local needs. These are complemented by landscaped open spaces that support environmental sustainability and encourage social interaction. Informed by comprehensive site analysis and comparative case studies, the project aspires not only to enhance athletic performance but also to strengthen community ties and promote active citizenship.

Keywords: Community Multi-Sport Complex, Athletic development, Climate-responsive architecture, Programmatic zoning, Environmental sustainability, Landscape design, Multifunctional

Pastoral Retreat: A Village of Sheep & Shepherds

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Abstract

Pastoralism, once a way of life in harmony with land and tradition, is quietly fading amidst the rise of modernity, globalization, and climate change. The study explores how architecture can serve as a bridge between preserving pastoral traditions and fostering contemporary retreat experiences in the Himalayan context of Khopra Danda, Myagdi, Nepal. The design seamlessly blends pastoral elements—such as sheep shelters, wool workshops, and cheesemaking spaces—with retreat facilities, including lodges, museums, and communal areas. Through extensive literature review, field surveys, and case studies, the research identifies gaps in the architectural treatment of pastoral settlements and explores how thoughtfully designed spaces can support both local pastoralists and visiting retreat seekers. The study proposes a symbiotic architecture that revives rural identity, supports local economies, and offers visitors a deeper connection to nature, community, and self. It is a retreat rooted in tradition, yet open to transformation. This study offers a model that can be adapted across Nepal and similar regions to protect cultural landscapes, enhance rural

economies, and reconnect modern individuals with nature and community through meaningful architectural interventions.

Keywords: Pastoralism. Retreat architecture, Rural livelihood, Rural tourism

Healing and Rebuilding Lives “Midway Shelter for Women Survivors of Violence at Kopila Nepal”

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Abstract

The Midway shelter for women survivors of violence is a transitional refuge designed to provide safety, support and empowerment to women recovering from abuse or violence. Many women find themselves in a precarious position who escape from domestic violence. Women survivors of violence require safe, nurturing environments to heal and rebuild their lives. The study explores the design of a midway shelter for survivors at Kopila Nepal who can't integrate into family, focusing on creating a holistic space that fosters physical, emotional, and psychological well-being. The objective of the study is to provide a safe and healing environment emphasizing the role of architecture in fostering recovery, building confidence and enabling reintegration into society. Through trauma-informed design principles, the shelter integrates security, privacy, and community support while promoting empowerment and resilience. Sustainable and locally sourced materials ensure environmental harmony and cultural relevance. By addressing the specific needs of survivors, this project aims to provide a transformative space that facilitates

independence, and reintegration into society. This holistic approach fosters resilience, reduces the risk of re-victimization, and empowers women to rebuild their lives confidently, breaking free from the cycle of abuse. Establishing such a haven is an invaluable step toward fostering healing, independence, and social reintegration for survivors.

Keywords: Midway, Shelter, Empowerment, Violence, Healing

Early Stage Diabetes Treatment Centre: Merging Nature, Space And Care

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Abstract

Diabetes mellitus has emerged as a critical global health challenge, demanding treatment strategies that extend beyond conventional medical interventions. This study explores a holistic design approach for diabetic treatment centres that integrates architectural principles, nutritional support, and lifestyle modifications to create environments conducive to healing and well-being. The proposed model emphasizes user-centric spatial planning, sustainable materials, and biophilic elements to promote comfort, relaxation, and engagement. In addition to medical facilities, the design incorporates nutrition-focused spaces, areas for physical activity, mindfulness zones, and opportunities for social interaction, highlighting the centre's role as a comprehensive hub for diabetes management. By harmonizing healthcare with architecture and lifestyle practices, this research demonstrates how the built environment can influence recovery, encourage adherence to treatment, and empower patients. Ultimately, it offers a framework for

reimagining diabetes care that prioritizes long-term wellness, patient empowerment, and improved quality of life.

Keywords: Diabetes management, Holistic design, Healthcare architecture, Biophilic design, Lifestyle modification

Life Beyond Bars (A glimpse of liberty for incarcerated persons)

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Abstract

This thesis investigates how architecture can shift prisons from punitive spaces to environment that foster rehabilitation and dignity. It highlights the impact of natural light, green spaces, communal areas, and thoughtful spatial planning on inmates' mental well-being, rehabilitation facilities and personal growth. Drawing from global case studies, it integrates principles of environmental psychology to propose a design framework that balances security with humanity. The research emphasizes reducing recidivism through skill development, education, and positive social interaction. The design concept focused on creating a humane correctional environment that balances security with rehabilitation. Inspired by principles of courtyard design and minimalism, the layout integrated open courtyards, green spaces, and natural light to promote mental well-being. Vocational training, education, and recreational facilities were central to fostering inmate skills and social reintegration. Materials like brick jalis, polycarbonate glass and forms were chosen for durability, safety, and a non-

institutional feel. Zoning was planned to ensure smooth circulation, clear separation of functions, and controlled access points. The concept envisioned a secure yet dignified space where architecture supports behavioural change, reduces recidivism, and prepares inmates for a meaningful life beyond confinement. The proposed design demonstrates how security and humanity can coexist; creating a model for future correctional facilities in Nepal that aligns with international standards, addresses current challenges, and fosters a more compassionate and progressive justice system.

Keywords: Prison, Rehabilitation, social interaction, recidivism, security

Living Small, Dreaming Big: Reimagining Urban Living for the Next Generation

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Abstract

Pokhara, renowned for its natural beauty and cultural richness, is rapidly urbanizing into a metropolitan hub that attracts students and professionals. However, the city's housing sector faces critical challenges, with rental units often being unaffordable, poorly planned, and environmentally unsustainable. Traditional housing preferences no longer align with the aspirations of younger generations, who increasingly seek compact, eco-friendly, and socially connected living environments. This study explores micro-housing and co-living as potential architectural solutions to address these issues. The proposed model emphasizes affordability, sustainability, and community interaction through innovative spatial planning and integration of local and global housing trends. By fostering environmentally responsible and socially engaging housing options, the research envisions a transformative approach to urban living in Pokhara. Ultimately, it presents a framework for rethinking housing strategies

that support economic sustainability, environmental stewardship, and the well-being of students and professionals shaping the city's future.

Keywords: Affordable housing, Sustainable architecture, Micro-housing, Co-living, Urban development, Pokhara

Waste Recycle Center

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Abstract

The concept of Waste Recovery Center is to transform waste from an environmental burden into a resource through integrated collection, sorting and recycling. Guided by the 3Rs—Reduce, Reuse, Recycle—it combines operational efficiency with public engagement, offering exhibition spaces, workshops, and observation areas to raise awareness. Architecturally, it prioritizes sustainability, contextual sensitivity, and openness, using passive design, green infrastructure, and local materials. By merging industrial functions like collection, sorting, cleaning, shredding, and transforming into raw material with community interaction, the project redefines waste management as a regenerative, circular, and socially inclusive process. Inspired by the lotus flower's symbolism of renewal, the design unites collection, sorting, recycling and public education under one roof. Its triangular form reflects the 3Rs—Reduce, Reuse, Recycle—while the circular layout represents a closed-loop economy. Sustainable strategies such as passive ventilation, day lighting, rooftop gardens, and the use of recycled local materials ensure environmental performance and

contextual harmony. This project highlights how a thoughtful architecture can promote public awareness, responsible practices, and sustainable urban development. It stands as an architectural statement that waste recovery also can be inspiring. This model can guide similar initiatives in Nepal and beyond.

Keywords: Waste Recovery Center, Environment, sustainable, community interaction

Shanti-ban Osho Meditation Center

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Abstract

This thesis presents the design of Shanti-ban meditation center in Baglung, Province 4, Nepal, designed to foster holistic well-being through Healing Architecture, biophilic design, and the integration of Osho's philosophy of healing. Addressing the modern need for mental and spiritual respite amidst fast-paced lifestyles, the project creates a sanctuary that nurtures mind, body, and spirit. Inspired by yoga, meditation, and Osho's teachings on inner transformation and mindfulness, the radial masterplan centers on a Meditation Hall, surrounded by quiet zones, gardens, and water features. Utilizing natural light, earthy materials, and the site's serene landscape, the design engages all five senses to promote inner stillness, emotional calm, and spiritual connection. Located near Baglung Bazaar, the center balances accessibility with seclusion, emphasizing sustainability and harmony with nature. This project exemplifies architecture's potential to create restorative environments that support

reflection, renewal, and holistic well-being through Osho's healing principles.

Keywords: Meditation Center, Healing Architecture, Biophilic Design, Osho Philosophy, Holistic Well-Being, Nepal, Baglung, Sensory Integration, Sustainability, Mindfulness.

Empowerment Center for Rainbow Community

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Abstract

From birth, individuals develop mentally, emotionally, and socially through interactions with society, which shapes their identity. However, society often imposes a binary view of sex, ignoring the complexity of sexual diversity. Diversity means recognizing that identity can form beyond this binary—in emotional, sexual, affective, or biological ways. The study envisions an Empowerment Centre for Nepal's LGBTQI+ community, addressing their social, emotional, and physical needs. Despite legal recognition, discrimination, stigma, and lack of supportive spaces persist. The center aims to create a safe, inclusive environment for connection, healing, and self-expression. By combining architectural theory with the specific needs of the LGBTQI+ community, the study highlights the role of architecture in social empowerment and its potential to change perceptions, promote inclusivity, and create a safe and supportive environment for marginalized communities. Through research and case studies, the design integrates inclusivity, accessibility, and safety with spaces for vocational training, counselling, advocacy, and community

interaction. Natural light, open courtyards, and quiet reflection areas balance social engagement with personal solitude. The project positions architecture as a tool for empowerment—fostering dignity, visibility, and societal acceptance while providing opportunities for skill development and self-reliance. Ultimately, the center stands as both a sanctuary and a symbol of pride for Nepal’s rainbow community.

Keywords: Empowerment, Rainbow Community, Safe Spaces, Diversity

Skill And Enterprise Development Centre: A Promotion Hub For Small Scale Industries

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Abstract

The Skill & Enterprise Development Center is conceived as a dynamic platform where innovation and tradition converge to strengthen small-scale industries and foster inclusive growth. This initiative responds to the need for sustainable economic opportunities by integrating incubation units, marketplaces, training halls, and specialized workshops within a single cohesive environment. The primary aim of the center is to empower women, youth, and marginalized communities by equipping them with entrepreneurial skills, technical training, and access to collaborative networks. The design incorporates interactive displays, collaborative studios, and shared courtyards, creating opportunities for hands-on learning, creativity, and community bonding. Methodologically, the project emphasizes inclusive and accessible design strategies, ensuring that facilities are adaptable to diverse user groups while respecting local cultural identity. By blending cultural heritage with contemporary approaches, the center functions not only as a place of vocational learning but also as a platform for innovation, cultural pride, and long-term self-

reliance. The outcome is envisioned as a sustainable ecosystem that bridges traditional knowledge and modern enterprise, contributing to economic empowerment, social resilience, and regional development. traditional skills and modern enterprise in a rapidly changing socio-economic landscape.

Keywords: Enterprise Empowerment, Inclusive Design, Skill Development, Small Industries Training and Workshops.

Multigenerational Village (A bond between orphan and elderly in a shared living environment)

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Abstract

This thesis proposes a multigenerational village that brings together orphaned children and elderly individuals within a shared, supportive community. The design fosters emotional support, mutual care, and intergenerational learning by providing safe, accessible, and engaging spaces. Beyond addressing physical needs, the project emphasizes emotional well-being through the inclusion of shared gardens, activity zones, and communal facilities that promote mentorship, companionship, and social interaction. By blending traditional Nepali values with contemporary design strategies, the village aspires to be a sustainable and inclusive model for community living—where different generations coexist, learn from one another, and thrive together. The architectural vision seeks to redefine care environments by shifting from isolated institutions to integrated, community-centered living.

Keywords: Multigenerational village, orphaned children, elderly care, design, shared spaces, communal facilities, mentorship, sustainable living, social interaction, community bonding,

A Multi-Sensory Museum for Endangered Species of Nepal

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Abstract

This thesis presents the design of a multisensory museum in Khapaudi Pame, Pokhara-18, Nepal, dedicated to the conservation of Nepal's endangered animals, harmonizing architectural innovation with ecological advocacy to counter biodiversity loss from urbanization, habitat destruction, and wildlife trade. Drawing on the "Broken Circle" philosophy, which represents the fractured cycle of life due to human activities, the museum employs narrative architecture, sensory technology, and interactive exhibits to create an immersive experience. This design guides visitors through an emotional journey—from guilt over species loss and awareness of its causes to empathy and hope for ecological restoration—fostering a deep sense of conservation responsibility. By integrating sustainable design principles, the museum minimizes environmental impact while serving as a transformative cultural and educational landmark. Located beside scenic Fewa Lake, the project leverages its natural setting to enhance visitor engagement, inspiring reflection and action to preserve Nepal's rich biodiversity for future generations.

Keywords: Multisensory Museum, Endangered Animals, Nepal, Broken Circle, Narrative Architecture, Conservation, Sustainability, Sensory Technology, Biodiversity.

Pokhara School of Arts: A Comprehensive Art School

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Abstract

The Pokhara School of Arts is envisioned as the first comprehensive art institution in Pokhara, bridging traditional Nepali practices with contemporary global art education. Rooted in the city's cultural richness and natural landscape, its design philosophy — Rooted in Place, Inspired by Nature, Driven by Creativity — emphasizes sustainability, adaptability, and community engagement. The project integrates studios, workshops, digital labs, galleries, and communal spaces, all supported by passive design strategies, the use of local materials, and rainwater harvesting systems. More than just an academic facility, it aspires to become a cultural landmark — one that nurtures creativity, preserves heritage, and inspires innovation.

Keywords: Art institution, Nepali art education, contemporary art, cultural heritage, sustainability, community engagement, creativity, innovation, traditional practices, local materials

Legacy of the Civil War: A Memorial for Nepal's Transformation

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Abstract

A memorial museum has a clear purpose to preserve, protect and exhibit the memory of significant historical events, often focusing on themes of loss, resilience and transformation. The decade-long civil war in Nepal reshaped the nation's identity, leaving a legacy of sacrifice, struggle, and transformation. The stories of grief and pain intricately reside in the hearts of Nepalese but current memorials including parks, sculptures and structures have physical but lack emotional connection with the visitors. Memorial museums bridges the gap between the memory and history by materializing narratives in architecture and artifacts, commemorating those who suffered and also showcasing the socio-political evolution of the nation. The study envisions a Memorial Museum in Liwang, Rolpa the birthplace of the conflict as a space of remembrance, reflection, and education. Through symbolic design elements such as memorial walls, reflective water bodies, and contemplative pathways, the project seeks to narrate Nepal's journey from conflict to peace. Informed by historical research, site analysis, and national and international case studies, the

design responds to Rolpa's terrain and cultural context. More than a monument, the memorial is envisioned as a living space that fosters dialogue, healing, and reconciliation, connecting the nation's past with its future.

Keywords: Connection, Memorial, Museum, Healing, Symbolic

Naturopathy Centre

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Abstract

This thesis proposes the design of Prakritik Shakti (natural energy), a Naturopathy Centre in Simle, Pokhara-31, envisioned as a holistic, drug-free healing environment that harmonizes with its natural surroundings. Grounded in the principles of Pancha Mahabhutas and Pancha Kosha, the centre integrates diverse therapies, including hydrotherapy, mud therapy, chromotherapy, yoga, acupuncture, dietary therapy, and meditation, to promote wellness. The design employs healing architecture, organic geometry, and climate-responsive strategies, utilizing sustainable local materials to create a restorative space. Drawing on the site's unique features—Begnash Lake, a prominent Pipal tree, and bordering streams—the architecture incorporates threshold spaces and flowing, irregular forms to craft a sensory-rich journey that fosters a deep connection to the earth. By addressing deficiencies in Nepal's naturopathy infrastructure, Prakritik Shakti serves as a model for sustainable, culturally resonant design, nurturing body, mind, and spirit while advancing environmental sensitivity and holistic well-being.

Keywords: Naturopathy, Healing Architecture, Organic Geometry, Pancha Mahabhutas, Pancha Kosha, Holistic Therapies, Sustainability, Cultural Identity.

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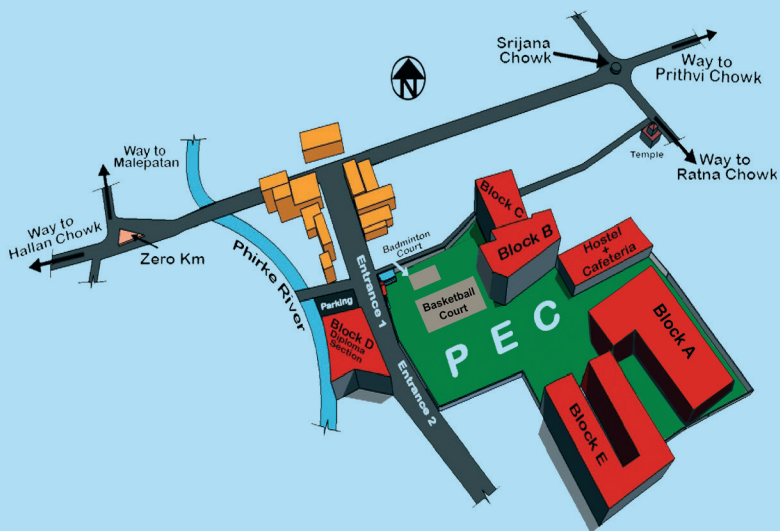
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