Proceedings/Book of Abstracts

of

2014 Joint ASNEngr/CAN-USA Annual Conference

(7th ASNEngr Annual Conference and Annual General Meeting and 7th CAN-USA Annual Development Conference)

"Applications of Engineering, Science and Technology in building a Safer, Better and Sustainable Society"

Edited by

Ramesh B. Malla, Ph.D. and Pradeep Khanal

Conference Organized By

American Society of Nepalese Engineers (ASNEngr)
P. O. Box 39524, 4904 York Road
Baltimore, Maryland 21212-9998, USA
Email: info@ASNEngr.org / Web: www.ASNEngr.org
and
Computer Association of Nepal, USA (CAN-USA)
PO Box 105, Pleasanton, California 94566, USA
Email: info@can-usa.org / Web: www.can-usa.org

Conference Hosted By

ASNEngr/Nepalese Engineering & Scientific Community of Arizona

Venue

Memorial Union Hall- Alumni Lounge

Arizona State University, 301 E. Orange Mall, Tempe, AZ 85281, U.S.A.

Date

Saturday, June 21- Sunday, June 22, 2014

Conference Websites

www.ASNEngr.org and www.can-usa.org

Foreword and Acknowledgments

The American Society of Nepalese Engineers (ASNEngr) and Computer Association of Nepal-USA (CAN-USA) held their seventh joint Annual Conference on June 21-22, 2014 at Arizona State University in Tempe, Arizona, USA. The conference was hosted by American Society of Nepalese Engineers (ASNEngr) and Nepalese engineering, scientific, and professional community of Arizona. The Conference was attended by about 60 participants, including practicing engineers, scientists, technologists, academicians, students, and industry leaders. The conference drew participants and speakers from the U.S., Malaysia and Nepal.

The conference, with the theme *"Applications of Engineering, Science and Technology in building a Safer, Better and Sustainable Society,"* deliberated on how state-of-the-art knowledge in Engineering, Applied Science & Disaster Communication such as Information and Communication Technology, Bio-Sciences, Medicine & Engineering Technology could be used to solve the problems in developed as well as developing countries including Nepal. The conference commenced after welcome speeches by Rajendra K. Shrestha, Ph.D., President of ASNEngr and Pradeep Khanal, Vice-President of CAN-USA. Thereafter, Ramesh B. Malla, Ph.D., Founding President of ASNEngr and Conference Technical Co-Chair gave an overview of the two-day conference.

The technical program included four sessions, including "Plenary Keynote/Invited Lectures;" "Earthquake Preparedness, Disaster Relief, and Infrastructure Safety in Nepal;" "Education, Engineering, and Technologies as Related to Nepal and Developing Countries;" and "Recent Advances in Engineering and Sciences." Each of these sessions will featured individual presentations and question-answer forum to facilitate sharing of knowledge and experience among fellow engineers, scientists and professionals. This year we had a plenary session consisting of two Keynote and one Invited guest lectures on very timely and important topics related to the conference theme presented by three distinguished individuals, Dr. Bharat K. Pahari, Dean of Institute of Engineering/Pulchowk, Nepal; Dr. Garry Dirks, Director of Julie Ann Wrigley Global Institute of Sustainability, Arizona State University; and Dr. Govindasamy Tamizhmani, Director of Photovoltaic Reliability laboratory, Arizona State University and the president of TUV Rheinland PTL, Tempe, AZ. The presenters and participants in the technical sessions are engineers, scientists, and professionals who come from a broad base, including academia, government agencies, and leading private and multinational industries. The program covers a wide variety of scientific areas ranging from disaster preparedness to earthquake safety and emergency communication, to bio-sciences, energy and environmental issues to recent advances in engineering and education.

The conference featured three other technical sessions with a total of 17 presentations among which one was presented from California via Skype. The sessions included *"Earthquake Preparedness, Disaster Relief, and Infrastructure Safety in Nepal," "Education, Engineering, and Technologies as Related to Nepal and Developing Countries," and "Recent Advances in Engineering and Sciences."* Each of these sessions featured individual presentations discussion and sharing of scientific and engineering knowledge and innovative social initiatives among

participating engineers, scientists and professionals. The presenters and participants came from a broad base of the academia, government agencies, and private and multinational industries.

Furthermore, ASNEngr held its 2014 Annual General Membership Meeting in which reports on the Society's multiple activities and accomplishments, including establishment of four engineering student scholarships in Nepal, were presented and the Society's future short and long term activities, plans, and other areas of interest were discussed. Upon the completion of the technical sessions, the conference attendees visited Chandler Innovation Center run by Arizona State University. One of the highlights of the innovation centers was 3D printing. The conference was concluded with the ASNEngr/CAN-USA Networking Dinner in the evening at a local restaurant.

Amid warm hospitality and flawless execution by the Conference Organizing Committees the highly successful 2014 Joint ASNEngr/CAN-USA Annual Conference ended on a very high note with lots of enthusiasm and momentum for the next year's conference.

ASNEngr and CAN-USA extend their sincere thanks and gratefully acknowledge many hours of voluntary time and efforts contributed by the members of the various Conference Organizing Committees (with special appreciation to members of the Local Organizing Committee) and the generous support provided by all the sponsors to make the event a grand success. Last but not least, ASNEngr and CAN-USA express their deep appreciations to authors/presenters and conference attendees without whose participation the Conference would not have been possible.

More information on this year's and past years' conferences can be found on the ASNEngr website at http://www.ASNEngr.org and the CAN-USA website at http://www.can-usa.org.

With warm regards,

Rajendra K. Shrestha, Ph.D., Conference General Co-Chair
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Houston, TX, USA

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Pradeep Khanal,
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Intel Corp, Santa Clara, CA, U.S.A.

Achyut Shrestha
Chair, Conference Local Organizing Committee
Member, Board of Directors, ASNEngr,

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Technical Session III: *Engineering, Development, and Education as Related to Nepal and Developing Countries*

Technical Session IV: *Recent Advances in Engineering and Sciences*

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Overall Program Schedule- at-a-Glance

Saturday, June 21, 2014

8:00 AM – 1:00 PM	***On-Site Registration***	*(Room 202)*
8:30 AM – 9:00 AM	***Conference Opening***	*(Room 202)*
9:00 AM – 10:30 AM	**Session *I (Plenary)***	*(Room 202)*

Session Title: *Plenary Session (Keynote and Invited Guest Speakers)-*

10:40 AM – 12:20 Noon	***Session II***	*(Room 202)*

Session Title: *Earthquake Preparedness, Disaster Relief, and Infrastructure Safety in Nepal*

(5 Presentations; 20 minutes each)

12:20 PM- 1:30 PM	***Luncheon***	*(Room 202)*
1:30 AM –3:10 APM	***Session III***	*(Room 202)*

Session Title: *Education, Engineering, and Technologies as Related to Nepal and Developing Countries*

(5 Presentations; 20 minutes each)

3:20 PM –5:00 PM	***Technical Session IV***	*(Room 202)*

Session Title: *Recent Advances in Engineering and Sciences*

(4 Presentations; 20 minutes each)

5:00 PM – 6:00 PM ***ASNEngr Annual General Membership and Board of Directors Meeting*** *(Room 202)*

6:00 PM – 7:30 PM ***ASU Chandler Innovation Center Visit*** *(249 E. Chicago Street, Chandler, AZ)*

8:00 PM – 10:00 PM ***Networking Dinner (***Taj Restaurant, 6245 W Chandler Blvd, Chandler, AZ)

Sunday, June 22, 2014

9:00 AM - 12:00 Noon ***Joint Nepal –U.S. Nepali Engineering & Scientific Community Discussion Forum***

(Venue: Meeting room, J.A. Wrigley Global Institute of Sustainability, ASU, Tempe, AZ)

9:00 AM - ***Grand Canyon, Sedona, Flagstaff, etc... (For those interested).***

12:00 Noon ***Conference Closure***

Detail Program Schedule

Saturday, June 21, 2014

Registration/Breakfast 8:00 AM

Conference Opening 8:30 AM – 9:00 AM

Conference Welcome and Organization Introduction –

by ***Rajendra K. Shrestha, Ph.D***. Conference General Co-Chair and President, American Society of Nepalese Engineers (ASNEngr); and ***Pradeep Khanal*** on behalf of ***Amod Pokhrel***, ***Ph.D.,*** Conference General Co-Chair and President, Computer Association of Nepal-USA (CAN-USA).

Conference Program Overview –

by ***Ramesh B. Malla, Ph.D.***, Conference Technical Co-Chair and Founding President, ASNEngr; and ***Pradeep Khanal***, Conference Technical Co-Chair and Vice President, CAN-USA.

Local Organizing Committee Welcome –

by ***Achyut Shrestha,*** Chair, Local Conference Organizing Committee and Member, Board of Directors, ASNEngr.

Session I (PLENARY) 9:00 AM – 10:30 AM *(Room 202)*

Session Title: *Plenary Session (Keynote and Invited Guest Speakers and Presentations)*

Session Chairs: ***Ramesh B. Malla, Ph.D***., Founding President, ASNEngr; University of Connecticut, Storrs, CT; and ***Nalini Chhetri, Ph.D.,*** Arizona State University, Tempe, AZ.

Invited Keynotes:

9:00AM - 9:30AM (Keynote Lecture):

Speaker: ***Bharat Raj Pahari, Ph.D.,*** Dean, Institute of Engineering, Pulchowk, Lalitpur, Nepal

Topic: ***"Role of Engineering, Science and Technology in Building a Safer and Sustainable Society in Nepal"***

9:30AM - 10:00AM (Keynote Lecture):

Speaker: ***Gary Dirks, Ph.D.,*** Director, Julie Ann Wrigley Global Institute of Sustainability, Arizona State University, Tempe, AZ

Topic: ***"Global energy situation and future scenarios in developing countries"***

Invited Guest:

10:00AM - 10:30AM

Speaker: by ***Govindasamy Tamizhmani, Ph.D.***, Director of Photovoltaic Reliability laboratory, Arizona State University and President of TUV Rheinland PTL, Tempe, AZ

Topic: **"Solar Photovoltaics: Vocational Training Tool for Trainers and Technicians"**

Break 10:30 AM – 10:40 AM

Session II 10:40 AM – 12:20 Noon *(Room 202)*

Session Title: *Earthquake Preparedness, Disaster Relief, and Infrastructure Safety in Nepal*

Session Chairs: ***Ananta Baidya, P.E***., San Diego, CA; and ***Netra Chhetri, Ph.D.,*** Arizona State University, Tempe, AZ

10:40 AM – 11:00 AM

"Overview of the Joint ANMF/ASNEngr/CAN-USA Initiative on Earthquake Preparedness and Disaster Relief in Nepal" by ***Ramesh B. Malla, Ph.D***., Founding President, American Society of Nepalese Engineers (ASNEngr) and Chair, Committee on Joint *ANMF/ASNEngr/ CAN-USA Initiative on Earthquake Preparedness and Disaster Relief in Nepal*; University of Connecticut, Storrs, CT, USA.

11:00 AM – 11:20 AM

"Some Proposals for Planning Regulations for Earthquake Resilient Urban Development in Nepal" by ***Ambika P. Adhikari, Dr. Des., AICP,*** Arizona State University, Tempe, AZ, USA; and ***Kanhaiya Kayastha, S.E., FASCE.,*** Los Angeles, CA, USA.

11:20 AM – 11:40 AM

"Disaster *Preparedness: Get A Kit. Make A Plan. Be Informed*" by ***Siru Prasai, M.B.B.S, MS, MPH,*** Maricopa County Department of Public Health, Phoenix, AZ, USA.

11:40 AM – 12:00 Noon

"A joint Nepal-USA initiative for disaster communications" **by *Suresh P. Ojha,*** IEEE Senior Member, Santa Clara, CA, USA.

12:00 PM – 12:20 PM

"A need for focus on safety in the planning, development, design, construction, and maintenance of Nepal's highways", by **Bharat Kandel, P.E.,** Department of Transportation, Mesa, AZ, USA.

Lunch Break (provided) 12:20 PM -1:30 PM *(Room 202)*

Technical Session III 1:30 PM – 3:10 PM *(Room 202)*

Session Title: *Engineering, Development, and Education* as Related to Nepal and Developing Countries

Session Chairs: ***Ambika Adhikari, Dr. Des., AICP,*** Arizona State University, Tempe, AZ; and ***Murari Pradhan, Ph.D., P.E.,*** Arizona Department of Transportation, Phoenix, AZ, USA.

1:30 PM – 1:50 PM

"Electric Products and Services for Rural Nepal" by ***Nathan Johnson, Ph.D.,*** Arizona State University, Tempe, AZ, USA.

1:50 PM – 2:10 PM

"Leveraging diaspora for desired social outcomes in Nepal" by ***Nalini Chhetri, Ph.D.,*** Arizona State University**,** Tempe, AZ, USA.

2:10 PM – 2:30 PM

"The Humanitarian Engineering Degree Program at ASU" by ***Brad Rogers, Ph.D.*** *and* ***Mark Henderson,*** **Ph.D.,** Arizona State University, Tempe, AZ, USA.

2:30 PM – 2:50 PM

"What explains the recent surge of apple orchards in Nepal's Mustang district?" by ***Netra Chhetri, Ph.D.,*** Arizona State University, Tempe, AZ, USA.

2:50 PM – 3:10 PM

"Involvement Nepal, Pre/Post Retirement" by ***Ananta Ram Baidya, P.E.,*** San Diego, CA, USA.

Break 3:10 PM – 3:20 PM

Technical Session IV 3:20 PM – 4:40 PM *(Room 202)*

Session Title: *Recent Advances in Engineering and Sciences*

Session Chairs*: Pradeep Khanal*, Intel Corp., Santa Clara, CA; and ***Sudip Koirala, Ph.D.***, Intel Corp., Chandler, AZ.

3:20 PM – 3:40 PM

"Renewable *Energy Technologies for Developing World*" by ***Lek Acharya***, Sun Electronics, Phoenix, AZ, USA.

3:40 PM - 4:00 PM

"*Information Technology*" by ***Mithun Bista***, Occidental Fire & Casualty, Scottsdale, AZ, USA.

4:00 PM – 4:20 PM

"Residential water pump operation and monitoring in Smart phone" by ***Achyut Shrestha,*** Apollo Group, Inc., Phoenix, AZ, USA.

4:20 PM –4:40 PM

"Crum Rubber Modified Asphalt" by ***Murari Pradhan, Ph.D., P.E.,*** Arizona Department of Transportation (ADOT), Phoenix, AZ, USA.

4:40 PM –5:00 PM

"***Structural Analysis and Design of a Human Habitat Concept on the Moon***" by ***Ramesh B. Malla, Ph.D***. *and* ***Kevin Brown***, University of Connecticut, Storrs, CT, U.S.A.

ASNEngr General Membership Meeting. 5:00 PM – 6:00 PM *(Room 202)*

Annual General Membership Meeting of the American Society of Nepalese Engineers (ASNEngr)

Chandler Innovation Center Visit 6:00 PM – 7:30 PM (*Off campus*)

ASU Innovation Hub /Tech Center. Address: *249 E. Chicago Street, Chandler, AZ*

Networking Mixer (includes dinner) 8:00 PM – 10:00 PM (*Off campus*)

(Location: Taj Restaurant, 6245 W Chandler Blvd, Chandler, AZ 85226)

Sunday, June 22, 2014

Special Forum: 9:00 AM - 12:00 Noon

(Venue: Wrigley Hall, Room: 323;, J.A. Wrigley Global Institute of Sustainability, ASU, Tempe, AZ)

***Session Title**: Joint Nepal –U.S. Nepali Engineering & Scientific Community Discussion Forum*

Conference Closure 12:00 Noon

Site Seeing Tour Departure time: 9:00 AM

Locations: Grand Canyon, Sedona, Flagstaff.

Technical Presentation Abstracts

Solar Photovoltaics: Vocational Training Tool for Trainers and Technicians

Govindasamy Tamizhmani, Ph.D.

Department of Engineering Technology, College of Technology and Innovation, Arizona State University

ABSTRACT

Solar photovoltaics (PV) is one of the fastest growing technologies for both centralized grid-tied (in developed countries) and distributed stand-alone (in developing countries) applications. Since Nepal is having a large number of remote communities, this technology can make an immense difference in the day-to-day lives of these people. However, in order to install, operate and maintain these small off-grid or stand-alone residential systems for long-term sustainability, the people need to be trained at both the trainer and technician levels. This presentation describes a training toolkit, called, Mobile Training Toolkit (MTT). This lab-in-a-box toolkit, developed under an USAID project called VOCTEC, can be used to train both trainers and technicians.

Director of Photovoltaic Reliability laboratory, Arizona State University and President of TUV Rheinland PTL, Tempe, AZ; E-mail: manit@asu.edu

Some Proposals for Planning Regulations for Earthquake Resilient Urban Development in Nepal

Ambika P. Adhikari, Dr. Des., AICP[1]; and Kanhaiya Kayastha, S.E., FASCE[2]

ABSTRACT

Recently, several international organizations have shown interest to support earthquake resilient urban and rural development in Nepal. Some Nepali organizations and government agencies have also been working towards earthquake preparedness and disaster-reduction and mitigation programs. These and other national resources provide an opportunity to strengthen the earthquake resilient urban planning system in Nepal and help protect lives and properly in case of earthquakes.

Nepal is listed as one of the most earthquake-prone countries in the world. The experience gathered from the most recent earthquakes in Nepal have made the Nepal government authorities, municipalities and the general public more aware of the possible threats in the loss of human lives and public and private properties should an earthquake strike. This is especially true for the densely populated urban centers like the Kathmandu Valley in the event of an earthquake of a large magnitude. Nepal has already initiated various plans and program to respond to the challenges of earthquakes. However, these efforts need to be firmly supported by appropriate policies and regulations guiding urban development.

The Nepali Diaspora community has also been concerned about the possibilities of earthquakes that can occur in Nepal, which can be devastating especially for the urban centers of the Kathmandu Valley. The American Society of Nepalese Engineers (ASNEngr), America Nepal Medical Foundation (ANMF) and Computer Association of Nepal-USA (CAN-USA) had in 2010 collaborated to prepare a position paper, entitled "Earthquake Preparedness and Disaster Relief in Nepal" which is planned to be published soon. This paper would provide some guidelines in the areas of engineering, health and communications to help prepare for the earthquake preparedness and mitigation plans and program in Nepal.

An important task towards reducing the risks from earthquakes and other natural hazards is to successfully devise, and enforce stringent building codes and standards and the planning and zoning regulations for urban development. With the haphazard, dense and often unsafe patterns of urban development in Nepal, it has become imperative that the local governments devise and strictly implement such regulations to help mitigate the impacts of any earthquake events in the urban areas.

This presentation will highlight some proposed urban planning and zoning regulations and guidelines which can help in creating an urban development that can better withstand earthquakes, and which can help creating development that facilitate disaster mitigation in the event of earthquake.

---

[1]Program manager (Research), Sr. Sustainability Scientist and Faculty Associate at Arizona State University, Tempe, Arizona, USA. (Address for correspondence:, Arizona State University, Polytechnic Campus, Sutton Hall, Ste. 340-B; 6049 S. Backus Mall MC-4280, Mesa, Arizona 85212 USA) . E-mail: Ambika.adhikari@asu.edu

[2]Civil and structural engineer consultant, retired Sr. Structural Engineer, City of Long Beach California, and Fellow of American Society of Civil Engineers; E-mail: kkayastha@aol.com

Disaster Preparedness: Get A Kit. Make A Plan. Be Informed.

Siru Prasai, M.B.B.S, MS, MPH[1]

ABSTRACT

So what do you do in the face of an environmental and weather hazard, emerging biological threats, pandemics or even a large scale terrorist attack? Even though personal preparedness is critical, individual perceptions influence internalizing preparedness recommendations and maintaining a household preparedness level. The need to prepare collectively is essential. Putting a plan in motion can reduce the fear and anxiety that accompany a disaster, improve the likelihood of survival and could mean the difference between the total loss of a resource and limiting or eliminating the resulting damage.

---

[1]Epidemiologist, Maricopa County Department of Public Health, E-Mail: siruprasai@hotmail.com

Radio Mala: A joint Nepal-US initiative for disaster communications

Suresh P. Ojha[1]

Sr. Member, Institute of Electrical and Electronics Engineers (IEEE)

Member, American Radio Relay League (ARRL)

W6KTM@arrl.net

ABSTRACT

Radio Mala is a joint initiative between institutions in Nepal and the United States to build disaster communications infrastructure in Nepal based on amateur radio technology. The goals of this ambitious project are to help Nepal by building skills, transferring knowledge, and installing disaster communication infrastructure.

This project has utilized the unique skills of multiple communities of peoples throughout the world with the single goal of building disaster communications infrastructure in Nepal. These communities include: leading institutions in Nepal, technology leaders in the United States, and members of the Nepali Diaspora in the United States and throughout the world. This paper will present a case study on how all of these differing institutions have come together to make Radio Mala a success. Additionally, it will present a status update on what has been completed, and what remains for Radio Mala.

---

[1]Senior Member, IEEE, Member, ARRL; Email: spojha@yahoo.com

A need for focus on safety in the planning, development, design, construction, and maintenance of Nepal's highways

Bharat Kandel, P.E.[1]
Department of Transportation, Mesa, Arizona

ABSTRACT

The author will present / discuss the following elements during the presentation. Safety of traveling public in high volume major connectors and low volume rural roads, safety of roadway workers – safe work zone, fall protection, hearing conservation, eye protection, wearing the personal protective Equipment (PPE) like hard hats, vests, steel tor shoes, working in trenches and confined areas etc.

Which of the elements of Manual of Uniform Traffic Control Devices (MUTCD), which is published by United States Federal Highway Administration, can be implemented in Nepal? Three E's of safety – Engineering, Education, and Enforcement. Maintenance Plan that is sustainable. Roadside Elements – trees, houses, businesses, people, livestock etc. that play role in safety. Building a quality roadway that is safe – quality control – quality assurance and acceptance. Using contracting methods and contract administration techniques that encourage creativity, increase transparency, provide incentives, and provide best value to the people of Nepal that play role in building sage highways. Roadway safety devises – that can provide safe crashes and that are maintainable in Nepal. The safety related incidents that have high frequency of occurrence – vehicle crashes, people being hit by vehicles, animal being hit, and vehicles falling from the edge of the roadways.

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Electric Products and Services for Rural Nepal

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ABSTRACT

The next 20 years are expected to show little change in the extent of electrification in remote areas of the world. This is clearly evident in Nepal, with over 65% of the rural population currently living without power. Solar lanterns and solar home systems are promising options for household lighting, yet those technologies are only initial steps to a long road of developing village-scale electrical services and powering economic growth. This talk will discuss technologies, business models, and management practices that can be tailored to meet the unique power requirements in diverse communities that have been difficult to electrify.

Village electrical needs can be broadly categorized into domestic, small business, entrepreneurial, and public service sectors. The cost of developing a single village-wide microgrid to power all sectors is cost-prohibitive due to the expense of wiring and power metering hardware, often with an end-cost to the user in excess of US$3.00 per kWh. Applied projects on point-of-use power systems by Arizona State University researchers are specialized to each endues category, and have resulted in levelized costs closer to US$0.50-1.00 per kWh. Examples include battery charging stations, lighting in clinics and schools, solar water pumps, lighting for small businesses, and powering simple machinery used by local entrepreneurs.

Arizona State University is situated to collaborate with local non-profit and for-profit groups to develop modular power systems that can be adapted to address a variety of electrical needs using combinations of the following located at a centralized village vocational or business hub:

- Entrepreneurial electrical access for food processers, sewing machines, pressing irons, fans in solar grain driers, etc. to foster economic development.
- Battery charging services for 12V lead-acid car batteries commonly used by households to power lights, radios, cell phone chargers, fans, and televisions in off-grid villages. Batteries can be charged and delivered to households for a negotiated fee.
- Single cell battery charging services or kits to displace disposable batteries that create a significant expense and environmental burden. Single cell batteries (AA, AAA, C, D) are commonly used in flashlights, radios, and other personal electronics.
- Do-it-yourself solar home system kits that include a small 50 W solar photovoltaic panel, a charge controller, two 10 W LED lights, a 50 Ah 12 volt car battery, and a DC outlet to provide five hours of evening lighting and phone charging needs.
- Pre-paid power services to purchase or recharge credits for household electricity use drawn from a micro-grid or a solar home system.

Clinic lighting systems and water pumping systems are typically designed separately.

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Leveraging diaspora for desired social outcomes in Nepal

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ABSTRACT

Universities are gradually moving beyond "knowledge first" approach in which scientific information is viewed as being sufficient for desired social outcomes to more "knowledge-intensive" endeavor that is geared toward the search for "solutions" as informed by science, technology and practice. In this endeavor building and maintaining strong working relationships and networks to design pragmatic approach to sustainable development is getting considerable attraction within academia. However, academic institute such as Arizona State University (like any other university) lack people on-the-ground to identify and carry out complex projects or research on development, innovation of locally relevant technology and a collegial link to policymakers and practitioners. Moreover, faculty and students lack the time to build relationship fundamental for translating the outcomes of research into policy and practices. This also entails the loss of opportunities to meaningfully carry out long-term collaborative research, an essential part of "knowledge-intensive" endeavor. Here in Arizona we have identified Nepali diaspora consisting of practicing engineers, entrepreneurs, social scientists, and academics, who can potentially provide a value-added and transformative collaboration to ASU in developing knowledge that is valued by Nepali society and policy makers.

As a start we have begun an alliance of professional expatriates and university that we have titled E^3 (education, engineering and entrepreneurial) programs. While being intellectually engaged, we hope to develop an exemplary collaboration between Nepali diaspora and ASU faculty (and students) to inform and mobilize solutions for social change across range of issues and scale that is driven by vision of equity and sustainability.

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The Humanitarian Engineering Degree Program at ASU

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ABSTRACT

In 2007 a diverse group of faculty members at ASU founded the GlobalResolve initiative, the goal of which is to focus the talents and capabilities of faculty and students at ASU on the development of enterprise at the base of the economic pyramid. Since 2007 GlobalResolve associated faculty have taught more than 500 students in project based learning classes that have resulted in more than 150 projects, several of which were taken to the developing world. Approximately 80 students have travelled with faculty on 15 trips to developing countries in Africa, Asia and South America. As the GlobalResolve initiative has evolved, the need for a comprehensive and systems level approach to challenges facing the developing world that cuts across disciplines, cultures, and socio-economic status has led to the development of the GlobalResolve Methodology. This Methodology articulates the diversity needed to make meaningful progress on problems in the developing world while at the same time embracing and organizing the disciplinary expertise that is needed to solve particular aspects of these problems. As the methodology has evolved it became clear that it can likewise form the underpinning of academic programs in several different disciplines. At ASU, this methodology has been used to design a new degree program in Humanitarian Engineering at the Polytechnic campus. In this presentation we will describe this methodology and how it has led to the development of the Humanitarian Engineering curriculum.

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What explains the recent surge of apple orchards in Nepal's Mustang district?

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ABSTRACT

Once considered isolated and remote, the valleys and ridges of Nepal's mountain district of Mustang are now rapidly transforming from subsistence to commercial horticultural. Farmers are capitalizing on ecological niches to produce high value crops such as fruits and vegetables. Additional changes include increased flow of tourists, access to market, improved government services, electrification, warming climate and development initiatives, all of which provide impetus for continuous growth of apple. This case study reveals specific contexts within which geographic expansion of apple farming has occurred. The contribution of apple to the local economy is so significant that it has garnered the attention of the media and has continued to receive national policy attention. Furthermore, trends show that, in the last 20 years, apple cultivation has moved some 50 kilometers northwards from Marpha as well as climbed to higher elevations (up to 3,676 meters asl) from Marpha valley (2626 meters asl) where it was first planted, giving an impression that climate may be a major driver fostering apple growth.

Undoubtedly, innovations in lift irrigation as well as food technology such as solar dried apple chips and growing number of distilleries have a role in enhancing apple farming. Other contributing factors include the expansion of infrastructure (e.g. road and airport) linking once remote district to national and global market. The recent surge of apple orchard in Nepal's Mustang district cannot be attributed to a single factor and need to be examined in combination.

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Involvement Nepal, Pre/Post Retirement

Ananta Ram Baidya, P.E. [1]
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ABSTRACT

Many desire to "do something in Nepal". Many want to contribute upon retirement. Challenged by that same desire, the author's personal on-going effort over the last three years has focused on providing meaning understanding of public safety though exposure to "fundamental concepts of land development, building and disabled access codes," including earthquake and fire safety and disabled accessibility.

Public understanding of aspects of public safety including disaster management and disabled access can occur only when many misconceptions, missed opportunities and understanding of the state of practice are brought to light. The US Government's significant contributed towards "Disaster Management" is well established. ASNEngr's involvement includes a position paper on earthquake disaster response. Disaster management based on pre-disaster mitigation technique remains unaddressed. Challenges to ensuring public safety and disabled accessibility prevail.

Aware of these situations, a course, entitled "Engineering Codes", was developed in 2012. As a Visiting Faculty, the author has taught this course at Kathmandu University since 2012. Two batches for a total of 36 civil engineering students have benefitted as of 2013. Experiencing the faces of students and other stakeholders light up during discussions and presentations has been fulfilling.

This narrative presentation attempts to share that experience and perhaps seek answers to some critical questions. What goals (and how lofty) to set? Can the cause of public safety, disabled access and other issues in Nepal be further enhanced through targeted involvement? Sustainability: finance and time commitment? Gaining the confidence of stakeholders, local experts and donor agencies? Might others be interested in making a difference using their own expertise and experience? Would the ASNEngr be a suitable platform?

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Renewable Energy Technologies for Developing World

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ABSTRACT

The paper discusses the applications of Solar Energy, Micro-Hydro and Wind Energy as a sustainable energy solution in the context of Nepal. The main objective is to purpose an energy independent off-grid system- as shown in the figure below- that uses Solar, Micro-Hydro and Wind Turbine technology for residential houses and small businesses of Nepal.
The breakdown of the main topics to be discussed is as follows:

- Design and Sizing of the system
- Technical details of the components included in the system
- Cost of the system
- Feasibilities of the system in Nepal
- Improvements /Improvisations needed in the system

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Information Technology

Mithun Bista[1]
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ABSTRACT

Information technology (IT) is "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications, computer hardware and mobile devices." IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information. Many companies now have IT departments for managing the computers, networks, and other technical areas of their business. IT jobs include computer programming, network administration, computer engineering, Web development, technical support, and many other related occupations.

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Crum Rubber Modified Asphalt

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ABSTRACT

It is great news that ASNEngr community is gathering at Phoenix, AZ for the 2014 Joint conference with a theme of sustainability. It is an opportunity to be exposed to the Crum Rubber Modified (CRM) Asphalt technology, simply known as rubberized asphalt. This technology is pioneered in Phoenix, AZ.

This technology is widely used worldwide today. The technology uses the ground rubber from waste scrap tires. Hundreds of millions scrap tires are diverted from the landfills to recycle to valuable use in asphalt pavement. This meets the theme of the conference on sustainability. Charles McDonald pioneered the technology. It is now an ASTM standard. Scrap tires tire are shredded and separated from non-rubber materials such as steel. 18% to 20% of ground rubber is used in asphalt and is CRUM. The asphalt rubber is widely used as open graded friction course over the concrete and rubber pavements as a normal practice in Arizona, California, Texas and Florida. This adds to other advantages on pavement as noise reduction (quiet pavement), control spray behind the vehicles and added life to the friction course.

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Structural Analysis and Design of a Human Habitat Concept on the Moon

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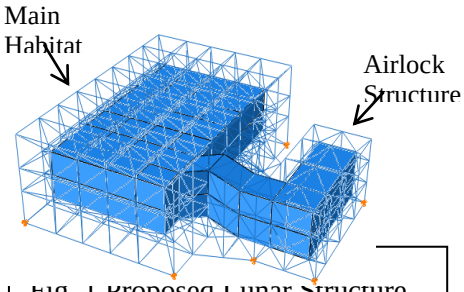
The ambient environmental factors on the Moon pose the most difficult challenges for long term lunar colonization. The radiation levels on the lunar surface far exceed those allowable for sustained human life. The extreme temperature variation combined with the long diurnal cycle also endangers human life greatly. Furthermore, the lack of atmosphere allows for hypervelocity micrometeoroid bombardment. In order to maintain a shirt sleeve environment, adequate shielding and internal pressure containment must be provided to protect the habitat and those inside from these factors. The high cost of transportation and the distant location of the Moon necessitate the use of local materials, such as regolith (in-situ resource utilization, ISRU), to help reduce the overall cost of the mission. Lunar regolith is believed to provide many benefits, the largest being ISRU which includes its use as a shielding material for radiation, temperature and micrometeorite impact.

This paper presents the analysis and design concept of a frame-membrane lunar habitat shown in Fig. 1 that is pressurized and uses lunar regolith as a radiation, temperature, and impact shield. Effects of these parameters on the structural design of the habitat is determined. An appropriate regolith shield depth to prevent the dangerous consequences of radiation exposure, hypervelocity micrometeoroid, and large thermal-gradient was determined from an extensive review of past and present research activities and publications. With the required depth of regolith known for each of the three factors, the governing thickness was applied to the frame-membrane structural habitat concept. An internal pressurization load varying from 0 (no internal pressure) to 96.5 kPa (14 psi) was applied to the structure. This range of pressure covers close to minimum recommended pressure to sustain human life to the normal breating terrestrial pressure.

With an adequate depth of regolith shielding and internal pressure applied, the static and frequency responses of the lunar structure were obtained using the finite element Abaqus computational code. The regolith was applied considering only its strength in compression. The results from the static analysis showed reduced stress and deflection levels throughout the structure because of the regolith mass which counteracted a portion of the internal pressure load effectively reducing its magnitude. The natural frequencies of vibration were also greatly reduced because of the increased mass due to the regolith shielding while there was no change in the stiffness of the structure. It is seen that a minimum pressure of 4 MPa is needed to excite the global mode of the structure, below which only the local vibrations are observe. Also it is observed that increasing the internal pressure increases the various modes of frequencies upto certain values and then seem to remain constant. The results from this study should be of significance in designing practical and realistic human habitat on the Moon.



Fig, 1 Proposed Lunar Structure

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About ASNEngr and CAN-USA

American Society of Nepalese Engineers (ASNEngr) *- a non-profit organization established in September 2007 with IRS 501(c)(3) tax exempt status – aims at providing a common platform for people of Nepalese background and their friends, in engineering and closely related scientific and technical areas to come together, exchange ideas, and support each other for their and the larger society's common good and benefits. It operates for engineering, scientific and technological research and educational purposes. The Society also strives at promoting engineering, scientific, and technological advancement in Nepal. The Membership application form and detailed information on ASNEngr and updates on its recent activities can be found at http://www.ASNEngr.org.*

Computer Association of Nepal-USA (CAN-USA) *is an American organization dedicated to the professional development of its members and technological progress of Nepal. It is a tax exempt 501(c)(3) non-profit organization with members throughout the United States. The organization continues to utilize the creativity and talent of its members and the broader American community to develop technology-rich solutions that address some of Nepal's challenges. Please visit http://www.can-usa.org/ for more information.*

Conference Websites

For more information on the conference, please visit the following websites:
www.ASNEngr.org ("Annual Conferences and Meetings") and
www.CAN-USA.org ("2014 Joint Conference")

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