



## Preventing Deaths Caused by Carbon Monoxide (CO) and Carbon Dioxide (CO<sub>2</sub>) Poisoning

By Alize Nepali, MBBS, and Tara Sigdel, Ph.D.

Despite increased access to education and means of communication that the United States has, unfortunate cases of deaths of children left in vehicles still become news headlines. Most often, parents or caregivers forget that the temperature can rapidly rise inside a closed vehicle and helpless children succumb to the heat that is beyond physiological range.

Similarly, in Nepal, we often hear news about the death of a family who went to sleep while keeping the charcoal burning keep their newborn warm. Other times we hear about the death of the people who descend wells to either clean or rescue someone who is suffocating in the well.

Basic knowledge about the importance of maintaining proper ventilation indoors and the danger at the bottom of wells could save innocent lives that we lose every year from carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>) poisoning. In this brief article, we present information about CO and CO<sub>2</sub> poisoning and propose some strategies that could help our community avoid these unfortunate events.

### What are CO and CO<sub>2</sub> poisoning, and how can I prevent them?

Carbon monoxide (CO) is a colorless, tasteless, odorless toxic gas that is a result of incomplete combustion of carbon containing material such as fossil fuels, wood, coal, charcoal etc. Unlike CO<sub>2</sub>, which is heavier than air, CO can spread evenly throughout the room because it has molecular weight similar to that of air. These characteristics make the inhalation of CO painless and easily overlooked; most deaths that occur due to CO poisoning happen while people are asleep. Once inhaled, CO replaces oxygen in the blood and gets enriched in the system, thereby causing impairment in the blood's capacity to carry an important component of our survival: oxygen. The Centers for Disease Control and Prevention (CDC), the

leading national public health institute of the United States, lists headache, dizziness, weakness, upset stomach, vomiting, chest pain, and confusion as symptoms of CO poisoning. The only way to prevent this issue is to avoid burning coal or firewood when the doors and windows are shut. If this is not possible, make sure there is proper ventilation in the room so that outside air can come in and the gases, from the burning, can go outside.

CO<sub>2</sub> is also a colorless and odorless gas that is not considered toxic to humans. It becomes dangerous, however, when we enter an environment where CO<sub>2</sub> replaces oxygen, as it is the heavier molecule. The situation is common in deep wells. Over time, wells that are not being used get filled with CO<sub>2</sub>. When people enter the wells to clean them, they become unconscious and eventually die because of a lack of oxygen, a phenomenon also known as "hypoxia" "asphyxiation." Prevention is rather simple: individuals who enter the well must try to light a candle or match. If this is not possible, we know that the well has CO<sub>2</sub>. From here, necessary precautions should be taken, such as taking a cylinder of oxygen to breathe through in the well.

### What more can be done to prevent these unnecessary deaths?

As shown by continuous deaths inside vehicles due to overheating, bringing awareness to completely prevent these unfortunate events is not an easy task. However, there is no better time to bring awareness about CO and CO<sub>2</sub> poisoning to the public than right now. Because we have a more educated general, easily accessible information sources, the media outlets including, magazines, radio, and TV channels, it should be easier to spread the words of awareness now than a few years ago. And, with the majority of the public having access to social media platforms such as Facebook, any small effort to bring to life this issue has potential to save lives.

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This journal is published twice a year by the Global Nepali Professional Network (GNPN). The GNPN 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 utilizes the creativity and talent of its members and the broader American community to develop technology-rich solutions that address some of Nepal's challenges.

The GNPN was originally established in July 29th, 2007 at the University of California Berkeley (UC-Berkeley) under the name CAN-USA.

Please visit our website at [gnpn.org](http://gnpn.org).

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## Welcome

By Suresh P. Ojha, President of CAN-USA

On behalf of the Computer Association of Nepal-USA (CAN-USA), welcome to all readers of this journal. We are especially pleased to offer our Namaste and this publication to all respected guests, delegates, and participants of the 24<sup>th</sup> CAN Info-Tech show and conference.

Ten years ago, CAN-USA began on the University of California, Berkeley campus with the goal of utilizing the collective information and communication technology skills and resources of Nepal's diaspora to serve Nepal. We also sought to provide a platform for the professional development and growth of our members. Over time we have evolved into an organization dedicated to impactful professional networking and focused problem solving. In 2017, CAN-USA, also known as the Global Nepali Professional Network (GNPN), celebrated ten years of service to Nepal, the Nepali diaspora, and to our members. To commemorate this important milestone, a major gathering was held in Silicon Valley in which Dr. Shabnam Koirala-Azad gave an inspiring keynote speech.

In Nepal, we continue our strong partnership with the CAN Federation via multiple means including the utilization of the information sharing center we jointly established in Kathmandu. This center is a permanent facility to help Nepalis receive training in a variety of skills as well as to provide office space for visiting members of CAN-USA\GNPN. The continued publication of the GNPN journal is also a strong collaboration with the CAN Federation. Via this journal we have highlighted the activities of the Nepal Ambulance Service (NAS), efforts to bring education resources via technology to rural Nepal, highlighted the mental health therapies presented to survivors of the Gorkha earthquake, and much more. The GNPN Journal has now become an important source of information in the US and Nepal to policy makers, researchers, technologists, academicians and others who are dedicated to understanding and presenting solutions to shared challenges.

We continue our steadfast commitment to disaster communications in Nepal. A principal means by which we do this is a partnership with Tribhuvan University's Institute of Engineering (IOE) via the Radio Mala amateur (ham) radio efforts. In addition to achieving numerous new technical advances, the IOE team, led by Dr. Sanjeeb P. Panday, received an historic recognition in 2017. The honorable Rohit "Ro" Khanna, a member of the United States House of Representatives, publicly recognized Dr. Panday for his tremendous contributions to disaster communications in

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# An Interview with Dr. Paul Auerbach, MD, Stanford University, co-Author of **Enviromedics: The Impact of Climate Change on Human Health**

GNPN Executive Board member Paul Auerbach has co-authored a book about the impact of climate change on human health. The GNPN Journal sat down with Dr. Auerbach to discuss his motivation for the book.

## **GNPN Journal**

What does the word “Enviromedics” mean and why is it in the title of this book?

## **Auerbach**

“Enviromedics” is a new term coined by the authors. It’s defined as the effects, consequences, and study of the impacts of environmental change upon human health. We intentionally foster an emphasis on health because we hope that it will inspire people to learn about their environment and its problems, and do something to make the world a better place.

## **GNPN Journal**

Why did you choose to write a book on this topic now?

## **Auerbach**

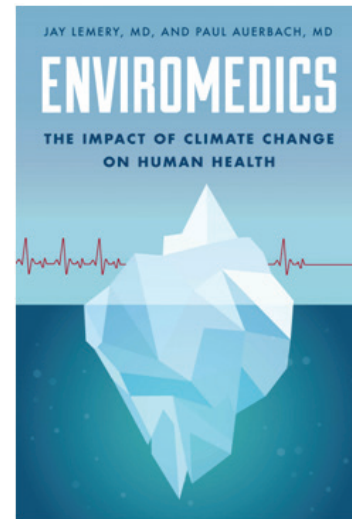
This book couldn’t be more timely, particularly given current events and the prospect of inadequate concern and action from industries and governments around the globe.

## **GNPN Journal**

What were some of the things that motivated you to write this book?

## **Auerbach**

I wrote Enviromedics because I care, as should we all, about the environment and life on this planet. Given my experience with wilderness medicine, it’s hard to imagine this specialty without the wilderness, which is where we may be headed. Forests cut down, endangered species driven to extinction, extreme weather events, greenhouse gases trapping heat and warming the planet, glaciers melting, sea level rise. It’s all happening, and in my view, we aren’t doing enough about it. In the emergency room, I see patients who suffer “acute on chronic” – meaning that someone with preexisting lung disease forced to breathe smoke from a wildfire decompensates. These patients are the tip of the iceberg, which is the image on the book’s cover. This book is a call to action for everyone, which includes the medical profession.



Front Cover of “Enviromedics”

## **GNPN Journal**

Climate change is an issue that has received much focus in recent years. What are some of the reasons that more progress has not been made in addressing climate change?

## **Auerbach**

Given the recent attention on climate change, it seems that there are still great impediments to our making progress on diminishing climate change. In an enlightened world, why is this the case? A number of things come to mind. First is the usual situation of economic interests not being aligned with environmentally sound practices. Second is either a lack of awareness of the magnitude of global warming or the opposite – full comprehension of a situation that is felt to be inevitable. In the latter, a person can become resigned and inert, and hopelessly do nothing. We can’t afford that. Another is the fact that our global thought leaders are not in agreement about whether and what environmental problems exist and therefore what should be done. Everyone agrees that cigarette smoking is harmful to human health. But we still have leaders who state that climate change is a hoax. That is uninformed and dangerous. If one visits Kathmandu, the air pollution is obvious year round. There are many factors that contribute to this situation, and perhaps no easy answers, but it is long past time for those of us who care about Nepal to leave this matter unaddressed.

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**1. The role of the government-** First, information about the risk of death due to indoor CO poisoning and CO<sub>2</sub> in wells without should be introduced in elementary school curriculums. With awareness at an early age, the next generation is more likely avoid these situations. Secondly, the government should take an initiative to produce TV and radio infomercials to broadcast nationally. Finally, the information about the dangers of sleeping with coal or firewood burning in the closed rooms or apartments should be disseminated nationwide through hospitals, clinics, and local government bodies.

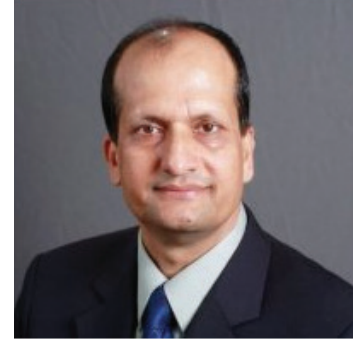
**2. The role of national and local media outlets-** Today, it is unfair to expect all help to come from the government, as public and non-government entities are equally powerful in bringing awareness to the public. We need discussions and interviews around these topics at both a national and local level, through outlets such as TV and radio.

**3. The role of expatriates-** Expatriates living abroad who are concerned and believe in the need of such campaigns, can raise funds that could be used to air infomercials and put up billboards along side of highways.

**4. Individual citizens** – Even though the government and national media have an extensive reach, each citizen should try to spread the word out to their friends, by means of mouth and social media. Communication will decrease the senseless losses of lives that could be saved by simple knowledge.



ALIZE NEPAL



TARA SIGDEL

Tara Sigdel, M.Sc., PhD, is an assistant professor at University of California San Francisco (UCSF). Dr. Sigdel has served various schools in Nepal as a teacher before pursuing a Ph.D. in Biochemistry from Miami University of Ohio. Dr. Sigdel has worked as a postdoctoral trainee and scientist at Stanford University in the field of organ transplantation. His current research involves with gene and protein profiling to identify and validate biomarkers to diagnose acute rejection of organ transplantation. Dr. Sigdel is also involved in finding better strategies to save the transplanted organs with precision medicine approach. Apart from a professional life in biomedical research, Dr. Sigdel is also involved community work in establishing peer mentoring in between youth in Nepal and the USA.



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Nepal. This is the first time in history that a member of the US Congress has recognized a technologist in Nepal in such a manner. The advancements achieved in Nepal by the IOE team continue to be widely recognized and celebrated internationally.

In the United States our Kurakani Series is entering its seventh year of hosting monthly networking events. These well-attended events bring together entrepreneurs, technical experts, academics, and members of the Nepali community as well as the broader American community for the thoughtful discussion of critical issues and provides an opportunity for collective problem solving.

We are also extremely proud of our fellow board member, Dr. Paul Auerbach, MD, of Stanford University, who co-authored the book, *Enviromedics: The Impact of Climate Change on Human Health*

CAN-USA/GNPN is privileged to have been able to serve Nepal and her diaspora for the last ten years. In this time, we have acquired credibility as an organization capable of partnering

with key organizations in Nepal and the US to produce consequential results. We look forward to another ten years of serving Nepal.



**Suresh Ojha** is a second-generation Nepali-American. In 2003, he established Nepal's only Radio Frequency and Microwave research and teaching laboratory at Tribhuvan University. He also established TU's coursework on RF and Microwave circuits and systems. Both are in operation today. Alumni from this program now work in Nepal and throughout the world including major electronics corporations in the Silicon Valley. He works as a principal design engineer for a major electronics company in the Silicon Valley in the United States.

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We convincingly make the case that significant bad health effects can be attributed to climate changes as they are currently projected. If there are disagreements about these changes or any other relevant aspect of climate science, we should get on with the task of framing the questions and determining the answers, because we owe it to our children and future generations to face this issue head-on.

#### **GNPN Journal**

Thank you, Dr. Auerbach, for meeting with the GNPN Journal.

#### **Auerbach**

It was my pleasure.



Dr. Paul Auerbach is the Redlich Family Professor at the Department of Emergency Medicine at Stanford University School of Medicine. He is also heavily involved in the advancement of the Nepal Ambulance Service (NAS)



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# Working with Pollinate Energy to address Critical Needs in the urban slums of India.

By Samantha Parker and Mira Diwan

## What is Pollinate Energy?

In 2012 the six co-founders of Pollinate Energy (PE), Jamie Chivers, Monique Alfirs, Katerina Kimmorley, Alexie Seller and Ben Marven, traveled to India to do field research. They visited urban slum communities in different cities of India and soon discovered vast differences between slums located in Mumbai and Delhi and those located near Bangalore.

The differences originated from the fact that Delhi and Mumbai, being more international cities, had more non-government organizations (NGOs) present and therefore the people of these communities received more aid than those located in smaller cities. In the slums near Bangalore the people lived on less than \$2 a day, lacked basic sanitation, water, electricity, and financial services. The slum dwellers in smaller cities were therefore even more disenfranchised than those in the large cities solely due to their location.

Pollinate Energy was created to serve slums like the ones near Bangalore by providing solar lights, water filters, and clean cook stoves which dramatically improve their lives.

## Pollinate Energy is now a hybrid organization with the following mission:

“Improve the lives of India’s urban poor by giving them access to sustainable products that make their lives better; empower local Indian entrepreneurs to be a positive force for change in India’s urban poor communities; make social business mainstream by raising awareness about the communities we work with and supporting the next generation of social entrepreneurs” ([www.pollinateenergy.org](http://www.pollinateenergy.org))

Currently, PE’s efforts are focused on selling low cost, high quality, solar powered lamps to the unelectrified urban slums of India. PE identified lack of electricity/lighting as one of the biggest problems these communities faced and decided to provide solar lighting products to them. These have been PE’s bestselling products so far. PE also sells an eco-friendly cook stove that reduces harmful fumes and uses less wood, as well as a water filter that provides safe-drinking water. Electricity is something a lot of people take for granted. Electricity brings about many benefits including: security, greater time, freedom, and even additional sources of revenue.

PE has come a long way since it was founded. In 2016, it completed the GSBI In-Residence Accelerator which is an

educational program run by the Miller Center for Social Entrepreneurship at Santa Clara University. Since then PE has remained in close contact with the Center, which is how the authors had the opportunity to work with PE.

## The Challenge

Despite Pollinate Energy’s expertise in solar lighting, it’s important to note that PE is not limited to only solar products. It is clear in their mission that they want to help in any way they can, which is why they wanted our help in scaling their impact. Therefore, our goal was to locate and help secure new markets for Pollinate Energy’s solar products.

## Methodology

Before embarking on this project abroad, we took a course emphasizing Human Centered Design Thinking (HCDDT) process and philosophy. This was an essential part to the successful completion of this project since the HCDDT philosophy emphasizes the importance in listening to the people you want to serve.

Subsequently, we created surveys that included both quantitative and qualitative data. The first item on our agenda was to understand the problems the members of these slum communities face, not the problems we perceive for them. It is only after we understand their perspective that we can start to ideate real solutions and facilitate effective and lasting change. We also collected product reviews and end-user stories from new and old communities (new communities refer to communities where PE had not yet made a sale). This exercise helped Pollinate Energy when entering new markets and communities.

## Key Findings:

### New Product Recommendations

While conducting baseline surveys during our community visits, one of our main goals was to get feedback on our current product market and to gauge customer satisfaction. After talking with many individuals, we realized that certain products, such as the cook stove were not meeting our end-users’ needs.

Using HCDDT, we contemplated new product ideas, including a solar headlamp and a redesign for the cook stove that would be more culturally appropriate.

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## GNPN Holds 10th Anniversary Celebration

By Hira Dangol



Participants of the GNPN 10th Year Anniversary Celebration

On October 14, 2017, CAN-USA/GNPN held its tenth anniversary celebration. This event took place in the heart of the Silicon Valley in San Jose California. The event consisted of a retrospective by past presidents of CAN-USA/GNPN, a review of current goals and a vision for the future by the current president, and an inspiring keynote speech by Dr. Shabnam Koirala-Azad.

In recognition of the contributions of CAN-USA/GNPN over the last ten years, numerous organizations sent representatives to the event. Among the Nepali organizations represented were the America Nepal Medical Foundation (ANMF) and the Bay Area Nepali Women's Organization (BANWO). In attendance were scholars from multiple universities, leading experts from numerous disciplines and technologists from some of Silicon Valley's most recognized companies. Many members of the broader Nepali Community attended as well.

The event was emceed by Ms. Dikshya Adhikari. Ms. Adhikari first asked the attendees to participate in a ham radio demonstration taking place between the Silicon Valley, and participants in multiple Kathmandu neighborhoods. Ham radio operators from California talked directly to operators in Baneshwor, Teku, and Swayambhu using nothing but small handsets.

Ms. Adhikary then proceeded with an overview of GNPN's history. Mr. Bineet Sharma the founding president of CAN-USA gave a retrospective of founding of CAN-USA in 2007, as well as a detailed description of key developments during his tenure which included the earthquake joint position paper co-authored by the American Society of Nepalese Engineers (ASNEng), the ANMF and CAN-USA.

Dr. Amod Pokhrel then commented on the key developments of his tenure as President of GNPN which included strengthening ties with key organizations in Nepal and the launch of the Radio Mala project.

Mr. Suresh Ojha, current President of GNPN outlined how this organization is different from other organizations. Specifically, he stated that GNPN has consistently demonstrate an ability to leverage networking among highly-skilled professionals throughout the world to achieve concrete problem-solving results. He reviewed ongoing GNPN programs. He stressed the core values of inclusion and collaboration as a fundamental part of the vision that has allowed GNPN to be successful.

Mr. Pradeep Khanal offered reflections of his Presidency, which took place during the devastating earthquakes of

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The headlamp is worn by an individual like a hat. It illuminates the area immediately before the wearer as well as making the wearer clearly visible at night. The inspiration for the headlamp originates from a multitude of conversations we shared with women in the communities. We learned that many women are afraid to go to the outdoor bathroom at night, given the high rate of sexual assault. In addition, often the breadwinner of the family works as a rag picker. Having the ability to use both hands while working at night increases productivity and safety. Therefore, not only are they able to go to bathroom and work in safer conditions, but they are also able to make more money for their families.

We also recognized the need to better educate end users about product technology, to ensure appropriate use of products. On multiple occasions, individuals were unaware of the importance of certain products, and were reluctant to purchase them due to price perception. We encountered multiple people who were unaware that their water was contaminated, and others who were resistant to purchasing PE's mosquito nets since they are priced higher than the average market value. Individuals often misunderstood that PE's mosquito nets provide long-term protection against insects since the nets contain insecticide on the fabric unlike most commercial products. In addition, the water filter is designed to filter microscopic pathogens from large amounts of liquid through a microfiber system, and requires minimal maintenance. They were often unaware of the benefit behind these products and the benefit of making a long-term investment in this sophisticated technology. Therefore, consumer interaction and education are essential when making sales.

### **Pollinator Upskilling**

While working in the field, we visited communities with several different pollinators, who serve as sales representatives for PE. While talking with pollinators during community visits, we discovered that a Pollinator-buddy system (two sales agents at a time) proved most effective when making sales in new communities. Multiple pollinators reported that when accompanied by research fellows, customers were more willing to listen and gave more importance to their presentation of products. In addition, Pollinators reported feeling less intimidated approaching people in new communities, with team members since they have more support when trying to gain people's trust.

We also observed that it is helpful for pollinators to have autonomy in accessing and verifying sales data in order to maintain the most accurate sales data for the organization.

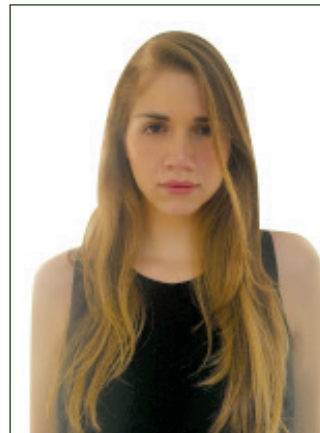
It may seem ineffective for pollinators to visit electrified locations, however electrification status changes often and needs regular verification.

### **Sanitation**

At the time of this project, PE was just beginning to expand into their 4th city, Kanpur. PE did not know much about the communities in this city. It is important to note that each community is different and communities in different cities can vary greatly. As we went into the Kanpur communities to collect data, one of the first challenges we confronted was that the information PE had on the Kanpur communities was incorrect. Key data such as percent electrification was updated by our efforts. According to PE's initial scouting fellows, the communities in Kanpur were 50% electrified, however, after interviewing and listening to the community members we found out that the communities were instead 71% electrified, meaning they had more access to electricity than was originally believed.

All communities we visited had serious problems of sanitation. We realized that the needs of the communities in Kanpur differed greatly to those in Lucknow, what the Kanpur communities needed were sanitation solutions much more than lighting solutions.

By contacting the Miller Center, we connected PE with another social enterprise, Banka BioLoo, which works on providing sanitation solutions to the rural areas in India. By doing this, we helped PE scale their impact by entering new locations.



### **About the Authors**

**Samantha Parker** is currently an undergraduate at Santa Clara University (SCU) pursuing a major in chemistry.

**Mira Diwanis** is a junior at Santa Clara University. She is majoring in public health, and minoring in biotechnology.



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2015. He listed the challenges faced by GNPN as well as the overwhelming response of Nepalis living in the US. He listed the numerous efforts GNPN engaged in during the earthquake in supporting post earthquake rebuilding work through identified projects in healthcare and education fields. He then introduced the keynote speaker Dr. Shabnam Koirala-Azad.



Keynote by Dr. Koirala-Azad, Dean of the School of Education at USF

Dr. Koirala-Azad is dean of the School of Education at the University of San Francisco. She is the first woman of Nepali origin to become dean of an American University. Utilizing examples from throughout the world, Dr. Koirala-Azad gave an inspiring presentation on constructing new frameworks, and methods for problem solving that lead to policies of hope, knowledge, and solidarity in midst of crises and mistrust. Following her presentation, Dr. Koirala-Azad entertained numerous questions from enthusiastic audience members.

Next, Mr. Rick Santina, General Secretary of GNPN, announced a special message from the United States Congress. He presented Dr. Sanjeeb P. Panday of Tribhuvan University a citation from the Honorable Rohit "Ro" Khanna, member of the US House of Representatives, stating, "This citation is presented to Dr. Sanjeeb P. Panday in recognition of his tremendous contributions to and advocacy for disaster communications in Nepal."

Finally, all attendees participated in a dinner networking event. Many participants in the event were highly accomplished professionals, current and past GNPN board members who discussed on important ideas for the future projects and initiatives.



**Hira Dangol** is a business-startup advisor who is passionate about connecting ideas, technology, and people. Dangol currently works at Bank of America as VP of Systems Engineering and advises OnTargetCloud, an early-stage startup. He has extensive technology experience from companies like AT&T and Cisco

Systems and currently serves as an executive for VLAB, a chapter of the MIT Enterprise Forum. He also serves on the board as VP for GNPN and founded Northernbelt Innovation Lab to inspire high-school students to pursue studies in STEM (science, technology, engineering, and math) fields.



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