My involvement with COVID-19 projects in Nepal

I came to Nepal on March 16th to build a Digital Learning Platform at Diyalo Foundation’s school in the eastern part of Nepal. However, due to the lockdown imposed by the Nepal government, all of my plans in Nepal were halted. Soon afterwards, the coronavirus situation in Nepal continued to deteriorate.

A few weeks after I returned to Nepal, Dr. Mahabir Pun called me. Dr. Pun is the Founder of the National Innovation Center (NIC) in Nepal. He invited me to work with him to develop COVID response technology products to help mitigate the spread of the Coronavirus. I accepted his invitation and started my involvement with building the emergency ventilator that was inspired by MIT’s E-VENT model.

In the beginning, the innovators at NIC did not have the expertise to design and build sophisticated Covid-19 response related products. I contacted several researchers at various universities who were working on COVID response projects to ask for technical support. I was pleased that Professor Jefferey Hall and Dr. David Robinowitz agreed to help. They run a lab that works with both UC Berkeley and UCSF. Soon afterwards, Professor Manu Prakash, who
leads Prakash Lab at Stanford University, also accepted my request for support and partnership. With these partnerships, we have developed projects to build both invasive and non-invasive ventilators, PAPR (Powered Air-Purifying Respirator) PPE, a fabric making machine for N95 equivalent masks, reusable Pneumasks, and a UVC Disinfection Chamber box. Stanford University and UCSF/UC Berkeley recently sent us four big shipments.

We have built the first version of invasive and non-invasive ventilators in collaboration with Prakash Lab at Stanford University. We are working on the second version now. Since Nepal has only one ventilator for every 100,000 people, we are planning to manufacture and mass-produce these ventilators in country. A traditional ventilator with similar functionality costs around $30,000 to $35,000; we are building our ventilators with local resources at a cost of about $650 each.
We are building a PAPR (Powered Air-Purifying Respirator) PPE in collaboration with a doctor and a professor from UCSF and UC Berkeley. We can build these PAPRs in Nepal using locally available resources. They will be able to filter 99.99% the air. These masks will safeguard doctors and frontline workers who are dealing with COVID infected patients. We will mass-produce these PAPRs in Nepal.
We are building a fabric making machine for N95 grade masks in collaboration with Stanford's Prakash Lab. This fabric can be made using plastic (PET) as a raw material that is easily sourced in Nepal. The masks made with this fabric will have the same quality as the N95 masks but cost only 10% as much.

We are collaborating with Prakash Lab to construct the reusable Pneumask. These masks can be reused just by replacing filter attachments. This makes them more economical and safer for frontline healthcare workers.

We also imported 30 Snorkel masks from Japan that were modified to Pneumasks. Furthermore, Prakash Lab shipped us 75 more Pneumasks. We donated these Snorkel masks to frontline healthcare workers in ICUs that treat Coronavirus patients.
Through the Resolution Project, I received support from GLG Consultations in NYC. GLC also connected me with a world-leading expert in UVC who worked at Trojan Technologies for over 20 years. This UVC chamber box can disinfect masks and gloves used by frontline healthcare workers within 7 to 10 minutes so that they can be used more than 10 times. The Prakash Lab gave us technical support to configure the UVC disinfection chamber for our purposes.

The National Innovation Center has successfully built 40 UVC chamber boxes and donated them to hospitals all over Nepal. The frontline healthcare workers use these UVC chamber boxes daily to disinfect the masks and gloves they use while treating patients. This project has directly impacted 500 frontline healthcare workers and over 8,000 patients.
Apart from the COVID response technological products, I have also started a manufacturing business. Through my company, I manufactured and delivered machines that convert a municipality’s solid degradable waste to organic fertilizers. The waste treatment plant can produce one ton of organic fertilizer an hour from solid degradable waste which would otherwise be dumped into landfills and river banks. This treatment plant will impact over 8,750 farmers by increasing their agricultural output by 30%. 
My work in Nepal over the past six months have been satisfying from both professional and personal standpoint. The unconditional support from many researchers, my mentors, professors and colleagues enabled me to create a positive impact in my community.

Thank you so much for taking time to read my update letter. I hope to send more updates in the near future.

With best regards,

Suman Kumar