Proposal for Covid-19 vaccination drive

- **Name of the institute:**
  - Indian Institute of Science, Bangalore
- **Incubator:**
  - Society for Innovation and Development (SID)
- **Faculty:**
  - Dr. Manish Arora
  - Prof. Ashitava Ghosal
  - Prof. Balan Gurumoorthy
- **Contact details:**
  - marora@iisc.ac.in, +91 9980836174
- **Objective:**
  - Development of an affordable, portable carriage box using a novel cooling system for last-mile vaccine delivery.
- **Type of Intervention: (Choose one)**
  - Proposal on Cold storages and Cold chains battery or solar operated for last mile connection
- **Details of intervention *(Should cover details about the product/technology, methodology, milestones, timeline, line-item wise financials along with tentative cost of transportation, annual maintenance etc.):***
  - ***Details about the technology:***

    In India, approximately 25% of vaccines are wasted annually before reaching end users. This wastage of vaccines leads to supply shortages, and an eventual inflation in cost. The primary reason for this is an inefficient cold chain, and logistics management system for last mile delivery. In an ongoing pandemic, executing a vaccination drive at the grassroots level with minimal wastage is paramount. The existing cold chain network in India is overwhelmingly reliant on large, refrigerated trucks for delivery at the tertiary level, and passive ice boxes for delivery at primary level of healthcare. The latter is made necessary because active systems are either expensive, inefficient or impractical when scaled down for last-mile delivery. This demands an efficient, affordable and portable solution that can actively manage cooling for last mile delivery so as to minimize wastage. The solution invented by the our team intends to do that.

    Medical literature dictates that the COVID-19 vaccines approved in India be maintained in hypothermic conditions (2-8 °C). This has been achieved by the developed solution using a novel, patent pending (IN201841006081A, WO2019202491A1) controlled cooling system that relies on convection and dry ice sublimation, in contrast to the traditional thermoelectric cooling employed by existing active storage systems. This has helped us achieve an estimated 91 percent reduction in energy consumption for a 6-hour preservation time, when compared to a commercially available device.

    - ***Tentative cost of transportation:*** ~50 INR/hour of cooling (2-8 °C)
    - ***Current prototype cost of each device:*** 15,000 INR
    - ***Estimated cost of mass-manufactured device:*** 5,000 INR
    - ***Weight of device:*** 1.5 Kgs.

- ***Power requirement during transport:*** None, post initial charge of battery.
- ***Methodology:***
  - A technology prototype of the device is currently ready and has been comprehensively tested for cooling performance. The next steps are to design a device that is meant to be robust, scalable.
- ***Milestones:***
  - Design for robustness, DfM, DfA of the device/technology
  - Multiple robust prototypes that can be manufactured at scale.
  - Preliminary testing of the device in-situ (within the field)
  - Identify manufacturing/scale-up partner.
  - Batch manufacturing of the device using mass manufacturing methods (injection molding, casting etc.)
  - Establishment of standard operating procedures and IP licensing
- ***Tentative budget:*** 30 lakhs total
  - ***Manpower:*** 9.6 lakhs
  - ***Consumables (including prototyping and testing):*** 10.4 lakhs.
  - ***Outsourcing:*** 6 lakhs
  - ***Travel:*** 1.5 lakhs
  - ***Contingency:*** 2.5 lakhs

Figure 1 - Prototype of the developed technology

Figure 2 - Prototype of the developed technology

Figure 3 - Loading of dry ice refrigerant

- **Do you have state government connection, or will you require support from CSR**?
    - Support is required from either the state government or CSR sources for further development of the prototype, in-situ testing and deployment. We are in touch Medical Officer from PHC in Shivamogga district, Karnataka who is keenly interested in such a solution for delivery of vaccine to far out sub-center. Connect with higher level officials will also help take this forward.
- **States that you can provide technology to –**
    - Immediate access to the technology can be provided to the state of Karnataka, followed by other neighboring states (Tamil Nadu, Maharashtra, Goa, Andhra Pradesh) in a phased manner.
- **Please answer following questions depending on the intervention you choose and if applicable to you:**
    - ***Can you do the community engagement yourselves or will need help by CSR?***
        - The team requires help with deployment and scaling up of the technology. This includes engaging with the community health workers for purposes of training and adoption. Team has some linkages with the local eco system.
    - ***If you have a Market ready technology available,***
        - ***How do you plan to deploy?***

          Deployment of the device/technology at scale will be done in phases. Initial focus of the team will be on developing a robust, scalable prototype. After this, we hope to work with an industry for manufacturing in large quantities and with government health authorities and CSR donors for distribution. All intermediate steps will involve extensive testing and validation to ensure efficacy and scalability.
        - ***Number of units available:***

          Currently, a prototype device is ready and available for testing. Additional resources are needed to improve prototype robustness and scalability.
    - ***Do u wish to partner with an NGO? If yes, name the NGO and provide details on how you will partner? (item wise costing should include cost to NGO for their scope of work)***
        - The team does not foresee a need to directly engage with an NGO. However, close engagement with state and local governments is required, particularly the departments responding to the COVID-19 crisis.

**** For this type of intervention, please send a separate 1-2 pager proposal that will include abstract of the planned/proposed work, methodology, tentative budget, and estimated timeline.**

******Kindly rename the document with your organization name for better sorting.***