# DISA-2019

1. **Name & Entry No of Team Member 1**

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1. **Name and Entry No of Team Member 2**

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1. **Name and Entry No of Team Member 3**

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1. **Title of Your Project**

Prevention of dust-inhalation among stone-cutter workers

1. **Which of these represent your project more closely**

A new idea/need for which we would like to come with a solution by carrying out proof of concept studies



We have a "proof of principle" or "proof of concept" solution/prototype. We would like to build a functional prototype. or come up with an implementable solution?



We have a functional prototype or working solution. We would like to carryout multi-user trials by deploying the same in field to refine/validate design/solution.



1. **Facilitator(s)**

Name(s) of Faculty:

Dr. Debabrata Dasgupta and Dr. Bahni Ray

1. **What is the need your project is trying to address? How did you establish the need?**

The need, which our project aims to fulfill, is to stop the rapid advancement in the number of deaths among stone-quarry workers, caused by Silicosis. Hundreds, possibly thousands, of mine workers have died of this incurable lung disease caused by long-term exposure to silica dust given off in the mining and processing of sandstone and limestone. There seem to be no effective measures currently in place to prevent this dust from reaching their respiratory tracts.

The need to address this issue arose primarily through the data obtained for the amount of PM1, PM2.4, PM4 and PM10 pollutants in the air near the stone industries of Bharatpur, Rajasthan. The level of such pollutants was found to be much higher than the recommended threshold which is considered safe for humans. As a result, a large number of people working in this area suffer from Silicosis and the average life expectancy is no more than 55 years. The necessity of our product is also supplemented by the lack of water as well as power resources in the area, either of which, our product does not bank on.

1. **Is this a new project or continuation of prior work done? What prior work or ground work is done at the time of submission of this project proposal.**

The project is new and has just gone through the formulation stage at present.

Data has been recorded for the levels of particulate matter of various sizes in the air around the stone industries of Bharatpur and the effectiveness of alternate solutions to the problem was analyzed.

During the interaction with the masons, it was found that the masks which are currently in use get clogged within short time and cause labored breathing.

It was also realized that spraying water was not possible everywhere due its paucity.

1. **What are the deliverable at the end of this project ?**

By the end of the project, we wish to deliver a proof-of-concept prototype which can be extended to a field-deployable functional prototype, implementable as an integral part of the mining process. Consequently, hazardous health conditions for the stone workers could be avoided. The cost and availability of the materials used for making the product will be taken into account since the ultimate aim is to make it as accessible as possible for its applicability in real life situations.

The product is, in essence, a dom-shaped foldable structure which surrounds the work piece entirely; with two holes having extendable telescopic arms protruding towards the interior of the dom. This would allow the stone cutter a wide range of movements to carry out their tasks. As the material of the sheets to be used will have high transparency, it would not hinder the visibility of work piece.

Our product aims to have a wide applicability ranging from marble and sandstone cutting to all sorts of small scale manual labor involving hazardous particulate matter entering the atmosphere.

1. **Describe how you plan to go about accomplishing your objectives.**

First, the basic design will be formulated based on which we will plan for the material requirements. Multiple designs and materials will be tested both in the lab and on-field sites both in and around the campus. According to the feedback we get from the workers, relevant modifications will be made while keeping in mind the ergonomics of the product and it's usage. Several more tests will be carried out in the field while constantly collecting feedback from the workers. At last we hope to achieve a reasonable balance between affordability and accessibility along with the user-friendliness of our product.

1. **What is the completion criteria? How will you know when you’re done?**

When we have successfully made a prototype of the product and carried out it's field testing, we believe that our project would have come to its completion.

On testing our product, when we observe a significant reduction in PM content in air, as compared to gas masks or water spraying, we would know that we are done.

1. **What is the contingency budget required to carry out this project ? (maximum amount is Rs 25000)**

Rs 24000

1. **How will the contingency budget be used in your project?**

Fabrication of metal frame = Rs.2000

Cost of using one material for trials = Rs. 1200

Overall cost of using multiple materials (about 15) and testing their properties = Rs. 18000

Unforeseen Expenses = Rs. 4000

Total budget required = Rs. 24000

1. **Link/website which provides additional information about your project (optional)**

<https://drive.google.com/open?id=1DBRxi2NgOljM20b3_zpdWfQaNYEfsssh>