

# Project Proposal Submission Round 1

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Your Name

B. Laasya

Your E mail Address

B.Laasya@iiitb.org

Your Phone Number

Mobile Phone number preferred.

812-390-5202

Date of Birth

1995/03/04

Country

Country | Select your Country from the Dropdown

India

Team member Contact Details

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### Title of the Project

Enter the project title

A smart shoe based environmental pollution and human activity recognition system

### Problem that you plan to solve?

Exposure to environmental pollution and physical inactivity increase the health risks associated with a wide range of avoidable Non-Communicable Diseases (NCDs) like respiratory and cardiovascular diseases. Also, recent studies done by the Association of Ambient Air Pollution and Physical Inactivity in the United States stresses on the relationship between physical inactivity, ambient air pollution and obesity[Please add reference here]. In order to establish a quantitative relationship between these seemingly unrelated quantities, it is important to track the physical activity of a person and pollution exposure levels through an array of sensors. This data has far reaching benefits both at the individual as well as the community level. It will help in drawing medical inferences on the impact of air pollution on individual health. And at the community level, it can be further analyzed to make well-informed policy decisions regarding the improvement of the community lifestyle by local governments. The data provided to pollution control board would help them take necessary actions to improve the area.

### Solution proposed :

Briefly explain the Solution you propose through this project (Within 500 words)

Advances in sensor technology, signal processing, and pattern recognition techniques in hospitals provide the ability to measure physical activity levels of a human being. When individual-level activity and environment statistics are integrated at the level of communities, the resulting data can provide feedback to both individuals and local governments. Individuals can benchmark themselves against others. Local governments can identify regions prone to low physical activity and high pollution levels, and take necessary precautions before leading to serious health impacts. This prototype helps in better mapping and understanding the link between urban air pollution and physical activity levels, and its impact on human health. In our prototype, different physical activities are determined with multiple sensors including accelerometers, and pulse sensors.

Sedentary or Low intensity activities like sleeping, watching television, desk work can be determined when the pressure sensors and accelerometer values do not vary much. These activities have a metabolic equivalent of a task (MET) less than 3.0. Walking at different paces has a MET ranging from 3 to 6. The pace at which the person is walking can be determined by pressure sensors and accelerometers. Vigorous activities or the High intensity activities involve bicycling, jogging, running and skipping with MET ranges from 6 to 10. Using the MET the calories burnt in a day can be calculated, provided the physical activity can be recognized using the accelerometers and pressure sensors.

The activity data is correlated with environmental markers determined by noise and pollution sensors. The physical wearable system is designed in the form of shoe based device with a wireless data logging facility. The wearable device offers information in the form of levels of physical activities. These activities are classified to four levels: sedentary, vigorous, walking and commuting. The environmental markers are arranged into four different types: fresh, low, moderate and high polluted space. At the end of the day, an inference is drawn, which will help the users to improve their health index in the future.

### Science/Technology/Engineering aspect in the solution

Briefly explain the technology involved in the project.

The technology used in developing our prototype involves an array of low cost sensors integrated together to establish a relationship between exposure to environmental pollution and physical inactivity in an individual. The sensors used are tri-axial accelerometers, barometric pressure sensors, microphones (to measure noise levels) and pulse sensors. The prototype is developed on an Arduino platform. The raw data collected from these sensors is logged into a storage device (like an SD Card) and then processed (using pattern recognition techniques) to draw an appropriate inference.

### Project Emphasis

Select all that apply , Select the relevant fields that your project lays emphasis upon

Other: Lifestyle & Wellness

## Proposed Project Budget

Enter the Total funding that you are expecting from IEEE / AIyeHum in USD

\$134

## Specify the Budget break up

Enter the high level Funding Break ups as in for Ex : Components XX \$ , Fabrication YY \$ so on.

Components :

1. Pulse Sensors ... 40 \$
2. Air Quality Sensor ... 28 \$
3. Arduino UNO R3 Board ... 26 \$
4. SD Card shield ... 16 \$
5. 3-axis accelerometer and 3-axis gyroscope ... 10 \$
6. Pressure Sensor ... 10 \$
7. Microphone Sound sensor Module ... 4 \$

### Target Beneficiaries

(actual people that get benefited by your project for ex: physically challenged, population deprived of electricity etc)

This project mainly targets the urban population, who have become prey to a sedentary lifestyle and increased levels of pollution.

In India for the past few years, efforts have been made to improve the healthcare facilities in the rural areas. Though rural healthcare is a serious issue, urban health care cannot be neglected. Despite the healthcare facilities available in urban areas, greater efforts need to be put in maintaining healthy lifestyle as the urban areas are at the higher risk due to increasing urbanization and increased pollution leading to unavoidable health problems.

### Have you identified a specific Beneficiary Partner?

This could be either a specific Target Beneficiary like a village xyz, person by name abc who is challenged by polio. OR it could be an external organization such as an NGO, local government etc.

Yes

### Name of the Beneficiary Partner.

if answered yes to the previous question

Community Health Cell (CHC), Bangalore

### Address of the Beneficiary Partner

#367, srinivasa Nilaya  
Jakkasandra I Main, I Block  
Koramangala, Bangalore - 560 034  
Karnataka

### Attach any other Supporting Documents

Attach any other document if required , if you have more documents to be uploaded - create a Zip folder with the Project title & attach here.

Attachment Size is restricted to 10 MB

assets/survey-uploads/11036/1442918-abVeBBtAZV/Humanitarian\_Challenge\_2014.pdf

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IEEE Membership number :

92817904

IEEE Membership Grade :

Student / Graduate Student / professional

Student

Are you associated with an IEEE Student Branch or a GOLD Affinity Group ?

If yes please specify the associated IEEE OU below

Yes

IEEE OU

Full name of the IEEE OU .

IEEE OU refers to your Student Branch/ Section /Affinity Group or any other IEEE Body that you may be a part of.

IIIT Student Branch, Bangalore Section, Region 10

Chairman / Counselor of your IEEE OU

Name

Dr. Debabrata Das

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