

# P13625 – Indoor Air Quality Monitor

Project Website: <https://edge.rit.edu/edge/P13625/public/Home>

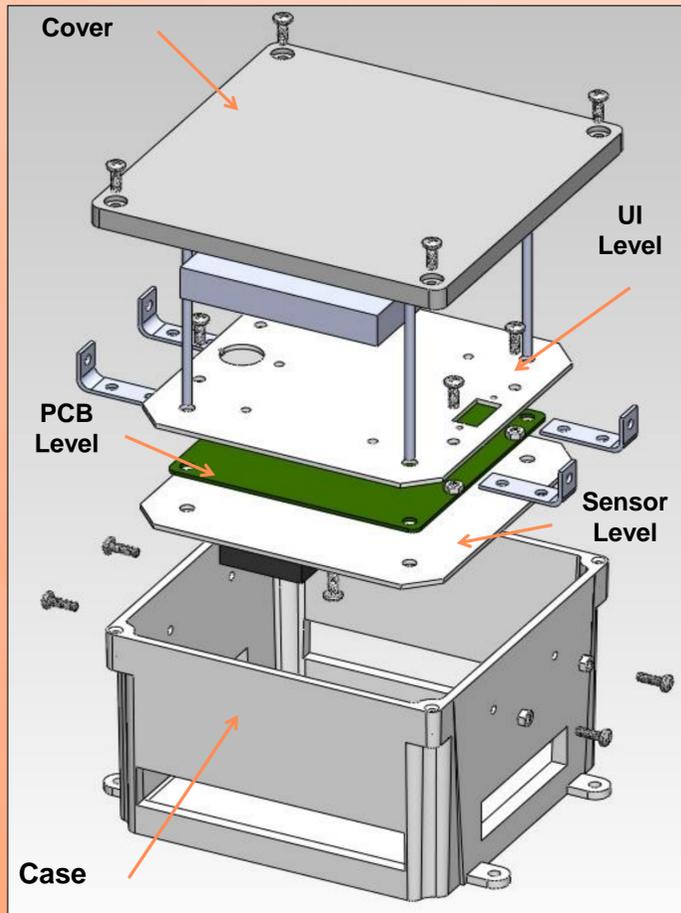
## Project Purpose:

The goal of this project was to redesign and improve the University of California Berkley (UCB) Particle and Temperature Sensor currently used by Dr. James Myers who is using this device to conduct research in developing countries. The device is used to collect quantifiable data on particulate matter from home environments in developing countries, which include cooking and heating fires.

The biomaterials currently being used as fuel for fires in developing countries contain materials ranging from construction debris and excrement to conventional heating materials. The research currently being conducted using the UCB monitor is attempting to quantify the health effects of these fires and as a result educational programs are being conducted to help improve these practices.

In addition to working to improve the data recorded on the device, one of the major goals of this project was to reduce the cost of the monitor to make it more accessible to researchers. These goals were limited by the desire to keep the new monitor on the same scale as the UCB monitor while ensuring that it can be used in a variety of environments.

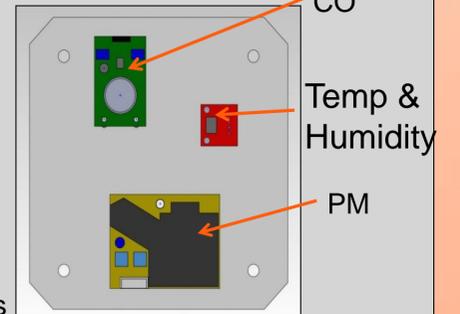
## Exploded Monitor Assembly



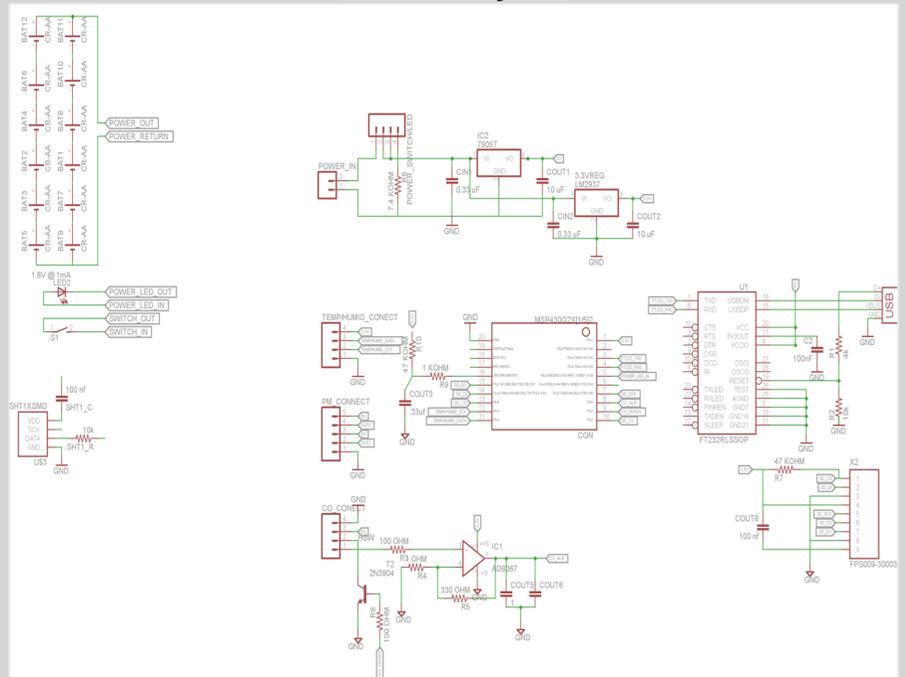
## Project Design:

- Create monitor capable of surviving both harsh and temperate climates (Haiti and Kosovo)
- Protect interior components (PCB and UI interfaces) with rugged case
- Keep out contaminants and other environmental factors
- Gather and store collected data
- Use readily available and lightweight materials

## Sensor Layout



## Circuit Layout



The circuit was designed to run an MSP430G2553, sensor's and the external communications for 10 days. The power came from 6AA wired in parallel with 6AA. the power was then regulated into a 5v and a 3.3v line. Communication with the device was performed using USB serial in/out.

## Project Results:

### Assembled PCB



### Assembled Monitor



## Future Improvements:

- Improve Battery Life of Monitor
- Accuracy of Data Collected
- Different type of Carbon Monoxide (CO) sensors
- Continuous data measurements (time history data)
- Different type of Particulate Matter (PM) sensor (ionization versus optical sensors)
- Design and build testing chamber that would allow accurate control and time history measurement of the temperature, humidity, particulate matter, and carbon monoxide

## Comparison of Monitors

	UCB Monitor	Our Monitor
Temperature	✓	✓
Humidity	---	✓
CO	---	✓
PM	✓	✓
Total Cost (Including Labor)	\$500	\$435

## Acknowledgements:

We would like to thank the following people for their support on this design project: Sarah Brownell (Faculty Advisor), Dr. James Myers (Customer), Rob Kraynik (Machine Shop), Multidisciplinary Senior Design Department



**Team Members (L to R):** Rachele Radi - ME, Shafquat Rahman - EE, Jeffrey Wojtusik - ISE, Kyle Sleggs - ME, Daniel Bower - CE, Alem Bahre Gessesse - EE