Wearable Detection Device for UV And Polluted Air Exposure

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Introduction and Background

Ultraviolet radiation is the primary cause of skin cancer. Air pollution impairs people's health. Therefore, people staying outdoors exposed to direct UV and air pollution need to be notified if they have been exposure to too much UV or air pollution for too long that they are in danger.

Some products in market like a UV- detected wristband called Sunfriend has no wireless communication which means the data cannot be recorded and displayed. Other air-detected devices are too big or heavy to be wearable.

Above all, there is no such a wearable device type which we are working on, or the existing devices are not good enough.
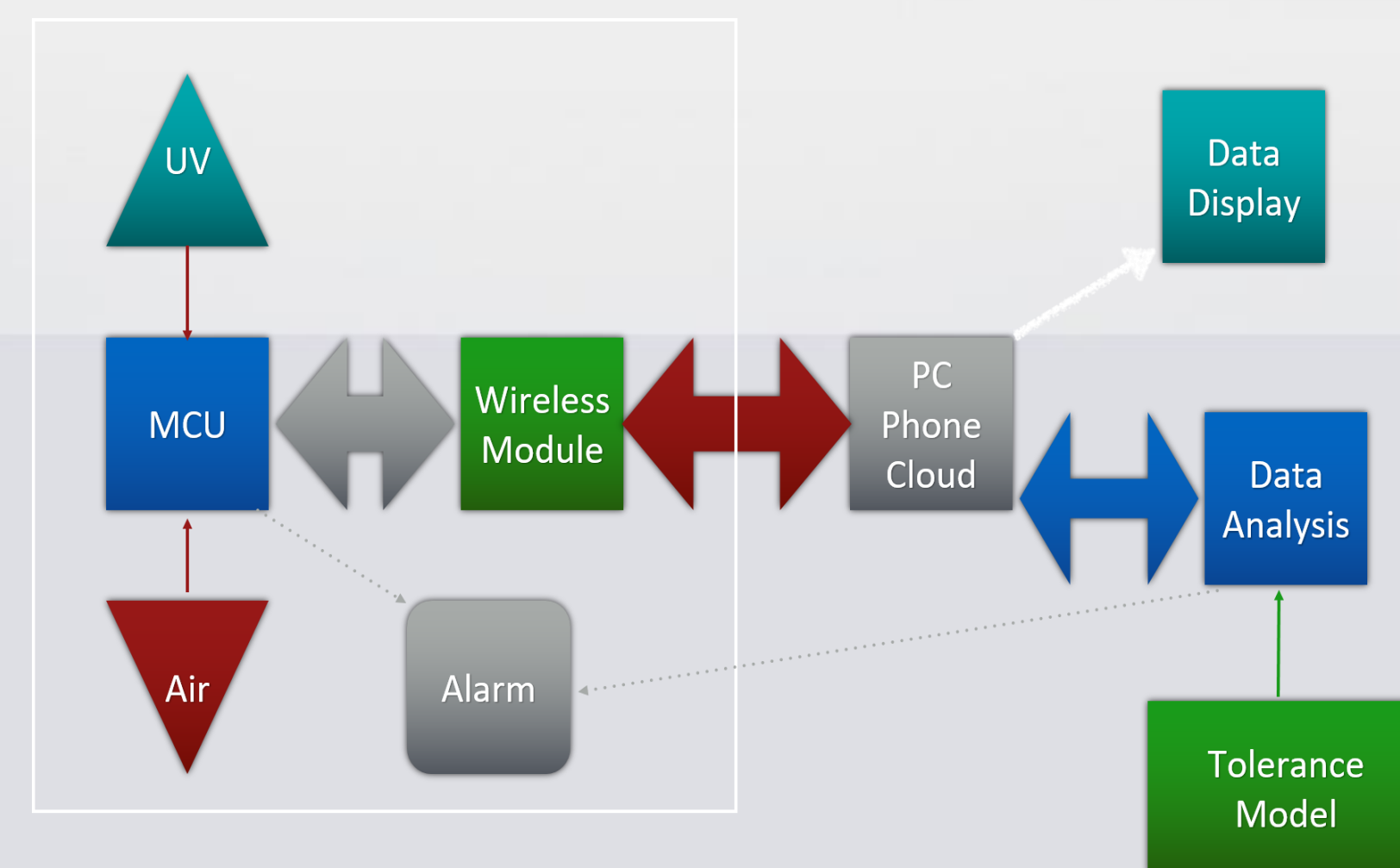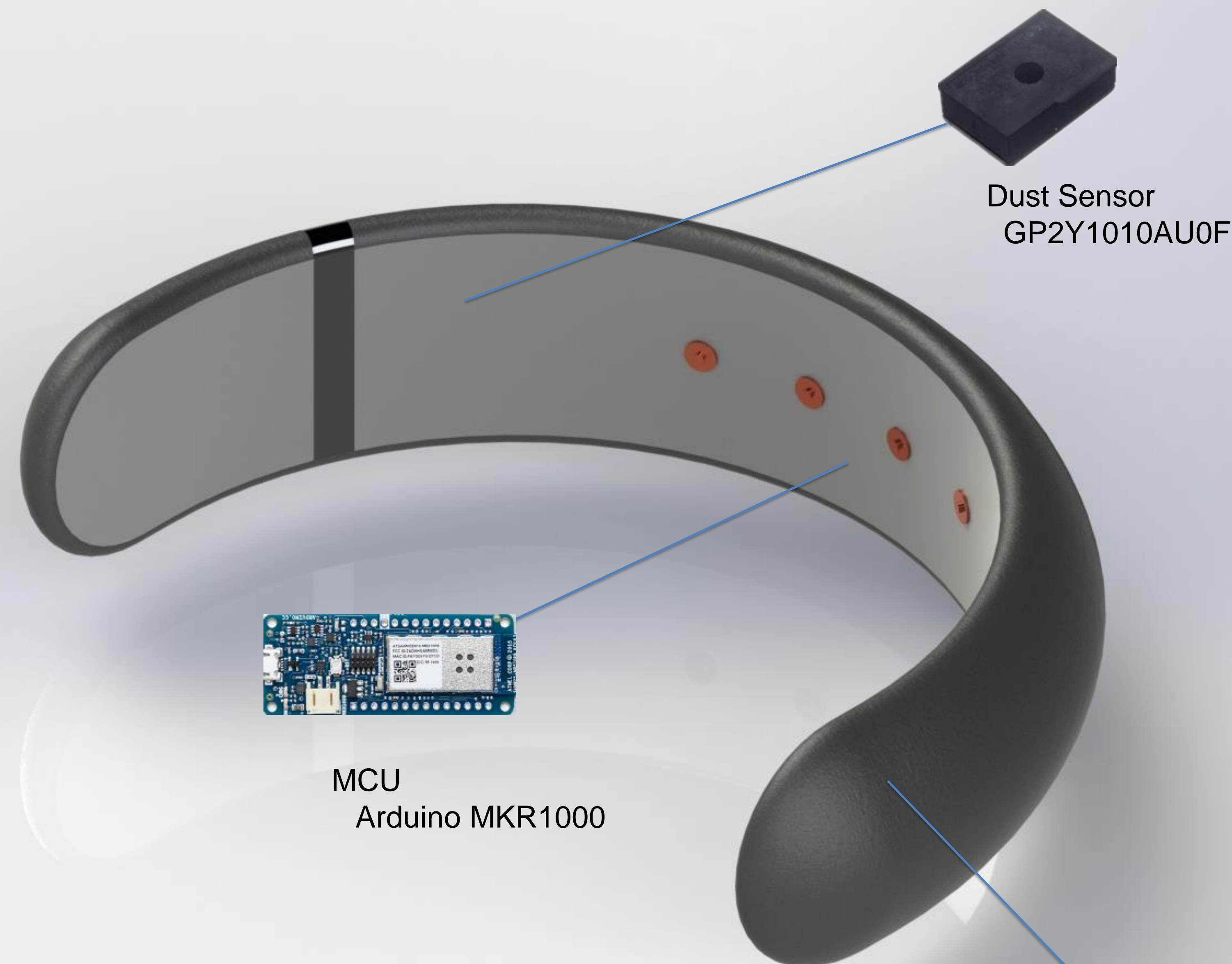
Goal

Develop a wearable device：
- To detect the exposure to the Ultraviolet and polluted air of the people who wear this device,
- To alarm when exposed to dangerous amount of UV or air pollution.
- To transmit data collected to smartphones or PCs where data can be organized and analyzed.
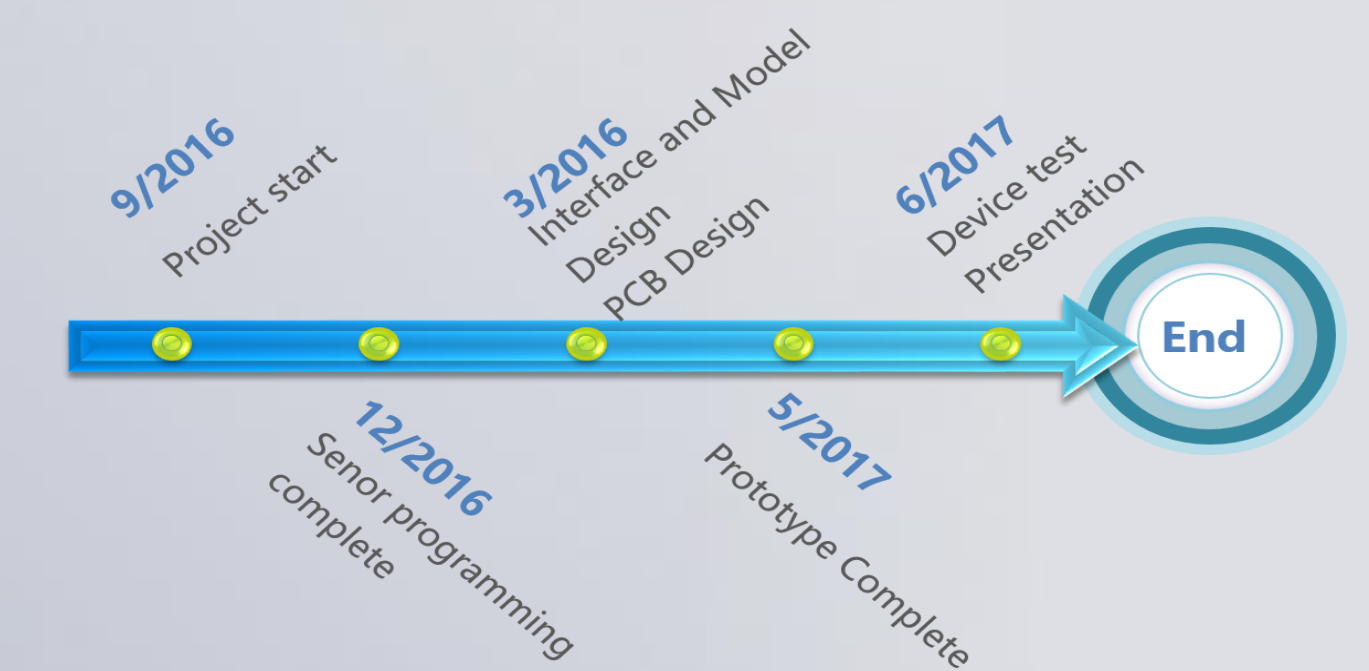
Approach and Innovation

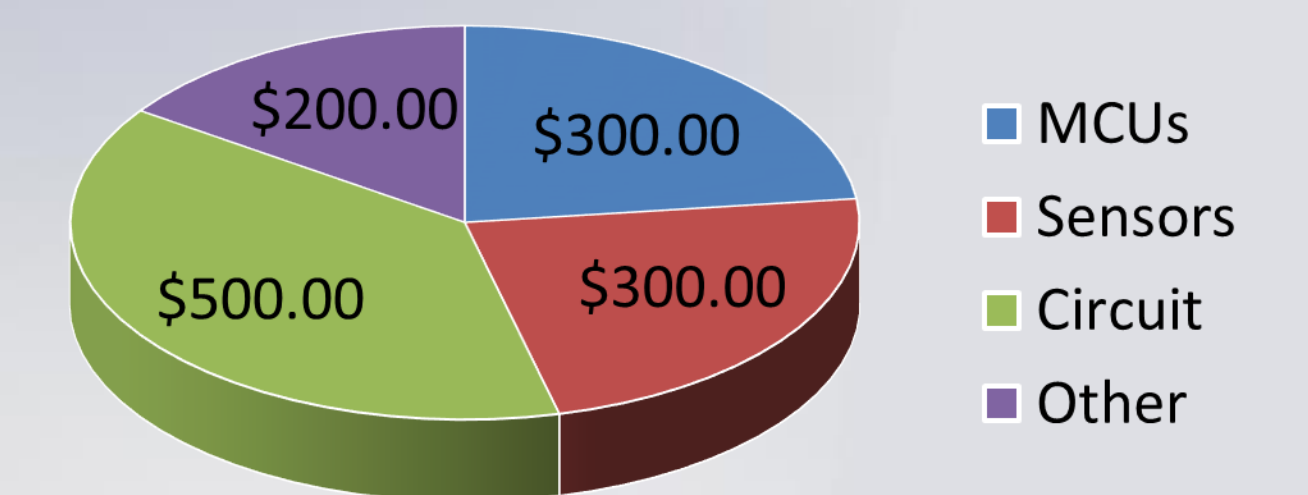The project is specified into hardware design, mathematical modeling and software design.

- Hardware includes sensors circuit design, programming on microcontrollers and wireless communication.
- Mathematic modeling includes doing research on human's tolerance to UV and air pollution and building a model to analyze data for alarm.
- Software design is mainly about developing a software interface on phones, PC or Cloud platform for data analysis and display.

Dust Sensor
GP2Y1010AU0F

MCU
Arduino MKR1000

UV Sensor
ML8511A

UV
MCU
Air
Wireless Module
Alarm
PC Phone Cloud
Data Display
Data Analysis
Tolerance Model

Timeline

9/2016 Project start
3/2016 Interface and Model Design PCB Design
6/2017 Device test Presentation
12/2016 Senor programming complete
5/2017 Prototype Complete
End

Budget

$200.00
$300.00 — MCUs
$300.00 — Sensors
$500.00 — Circuit
Other

Current Status

So far, we have finished the programming on the both UV and air sensor and completed the transmission and display of the data. We have tested the UV sensor with simple mathematical models and completed the display.

Now we are working on building the model of dust sensor and building the alarm system.

Link for more information
http://www.ucimaeprojects.com/projects/2016-2017-sensor-based-solutions-to-real-world-problems/

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