

## Motivation

- Ultraviolet radiation is the primary cause of skin cancer.
  - Air pollution impairs people's respiratory system.
  - People staying outdoors exposed to direct UV and air pollution without knowing it.
  - All products which can detect the UV and air pollution in market are not good enough or are too large to be wearable.
- Therefore, a wearable device which can detect UV and air pollution then give the alerts to users is in need.



## Objective

Develop a wearable devices that:

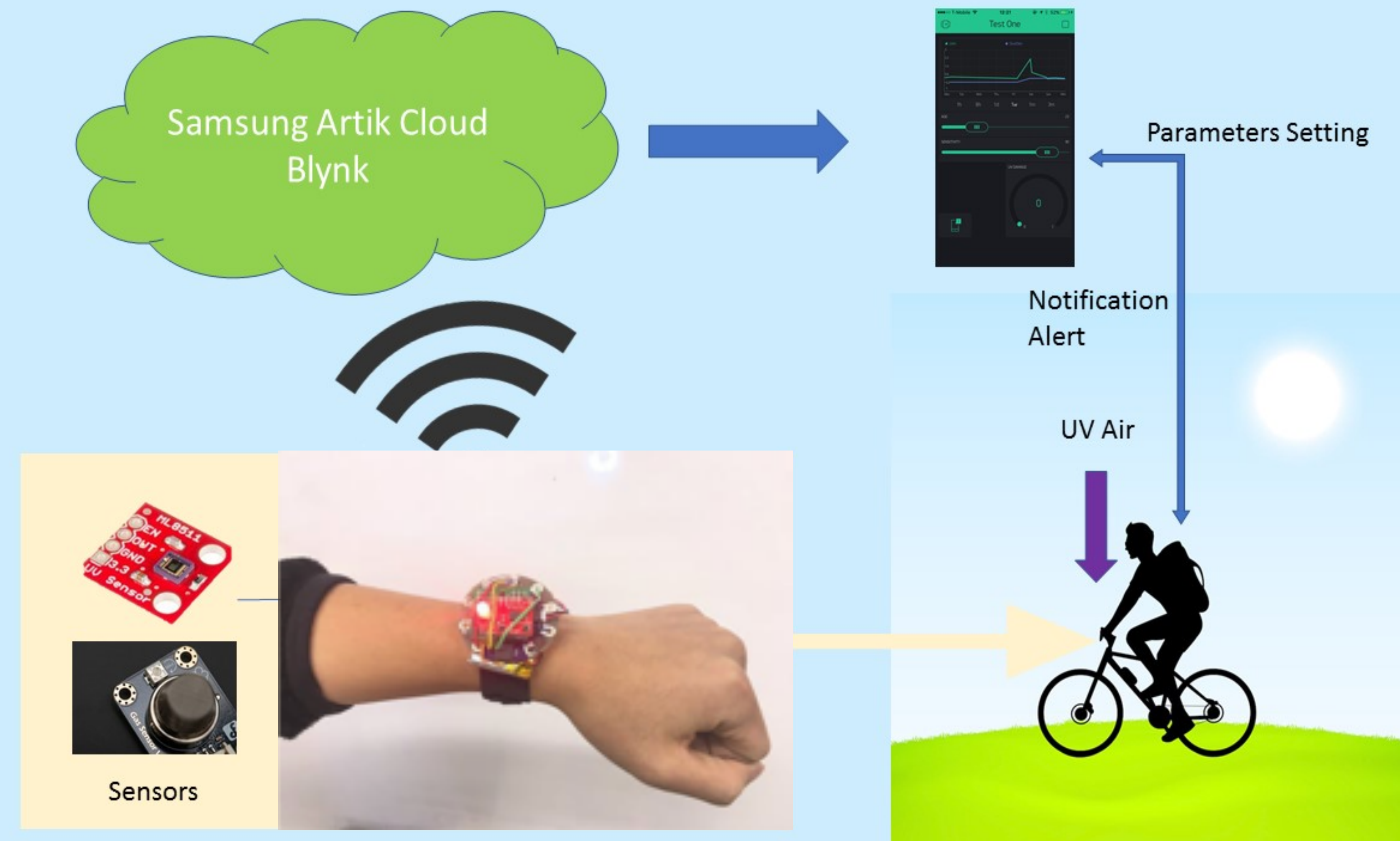
- Detect the exposure to the Ultraviolet and polluted air of the people who wear this device;
- Alert when exposed to dangerous amount of UV or air pollution;
- Transmit data collected to smartphones or PCs where data can be organized and analyzed.

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•Link for more information

•<http://www.uciameprojects.com/projects/2016-2017-sensor-based-solutions-to-real-world-problems/>

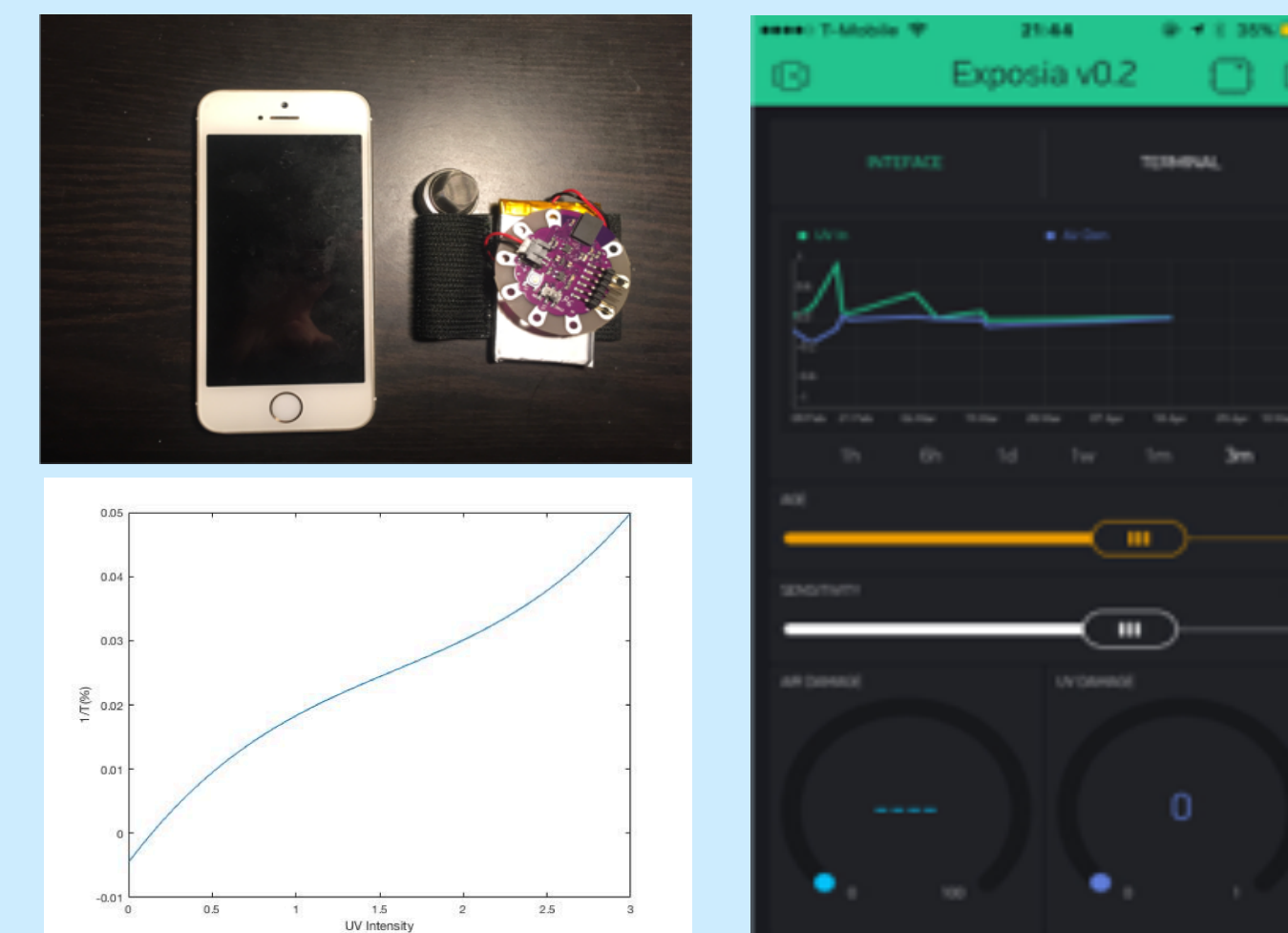
## Result



## Method

The project workload can be divided 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.



## Conclusion

- Designed and built 3 different wearable prototypes, including 1 BLE version and 2 Wi-Fi versions;
- Developed 2 iOS Apps that work with the prototypes;
- Established 1 web-based Data Dashboard that works with the Wi-Fi prototypes.
- Built and implemented the Mathematic Models of UV Damage Dose and Air pollution Damage Dose; In comparison, The Wi-Fi prototype sacrificed its mobility in exchange of stable Internet interface, communication of IoT Cloud and stronger ability of computation. The BLE version, has better mobility without Internet interface.

## Future Work

- Update the Applications Regularly.
- Design a Universal Package.
- Build an Internet Analysis Interface of the BLE Prototype

## Reference

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