Wearable Device for Detection of Over Exposure to UV Radiation And Polluted Air

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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

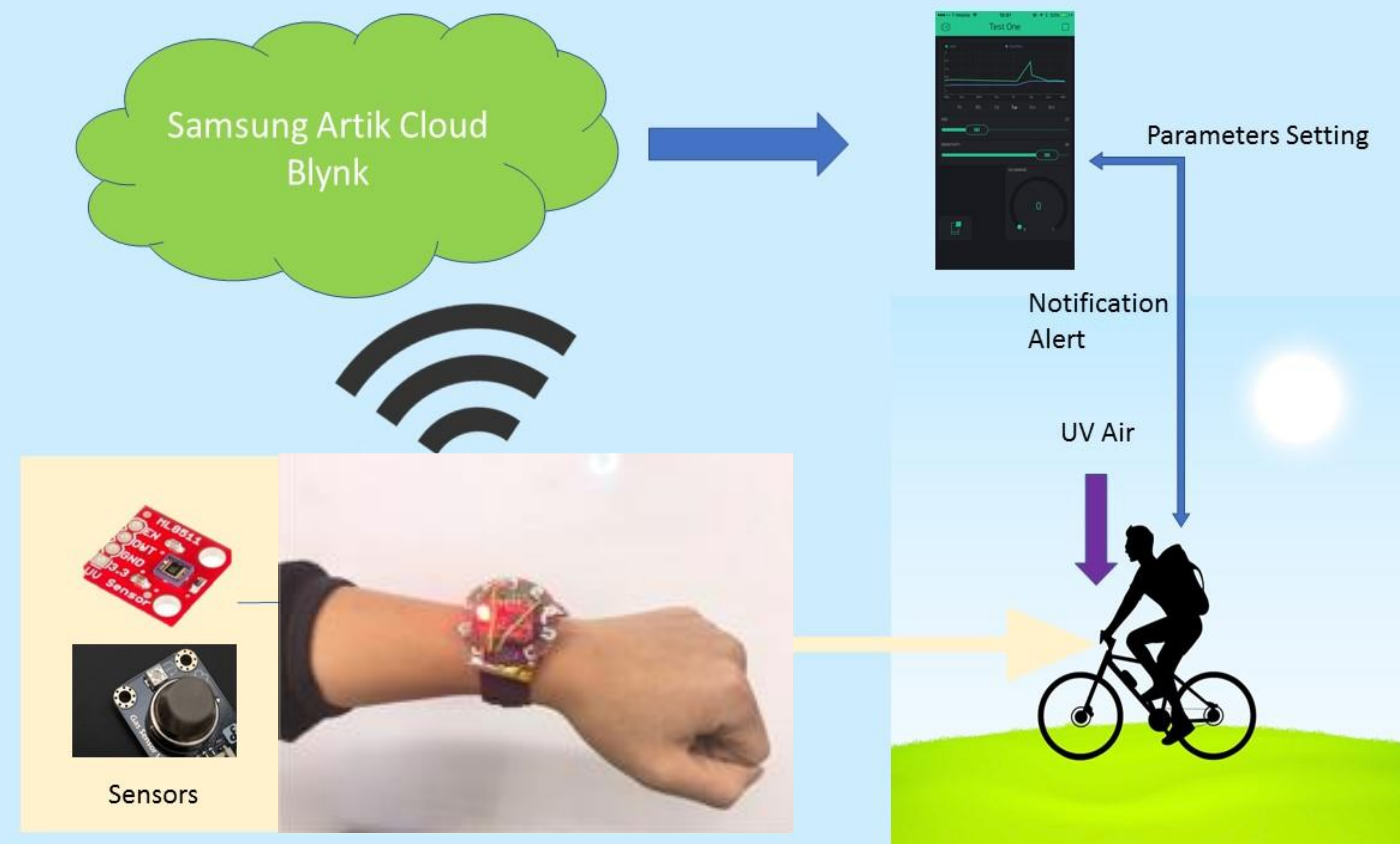The objective of this project is to develop a wearable devices that：

- 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.ucimaeprojects.com/projects/2016-2017-sensor-based-solutions-to-real-world-problems/

Result

Samsung Artik Cloud Blynk

Parameters Setting

Notification Alert

UV Air

Sensors

Method

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.
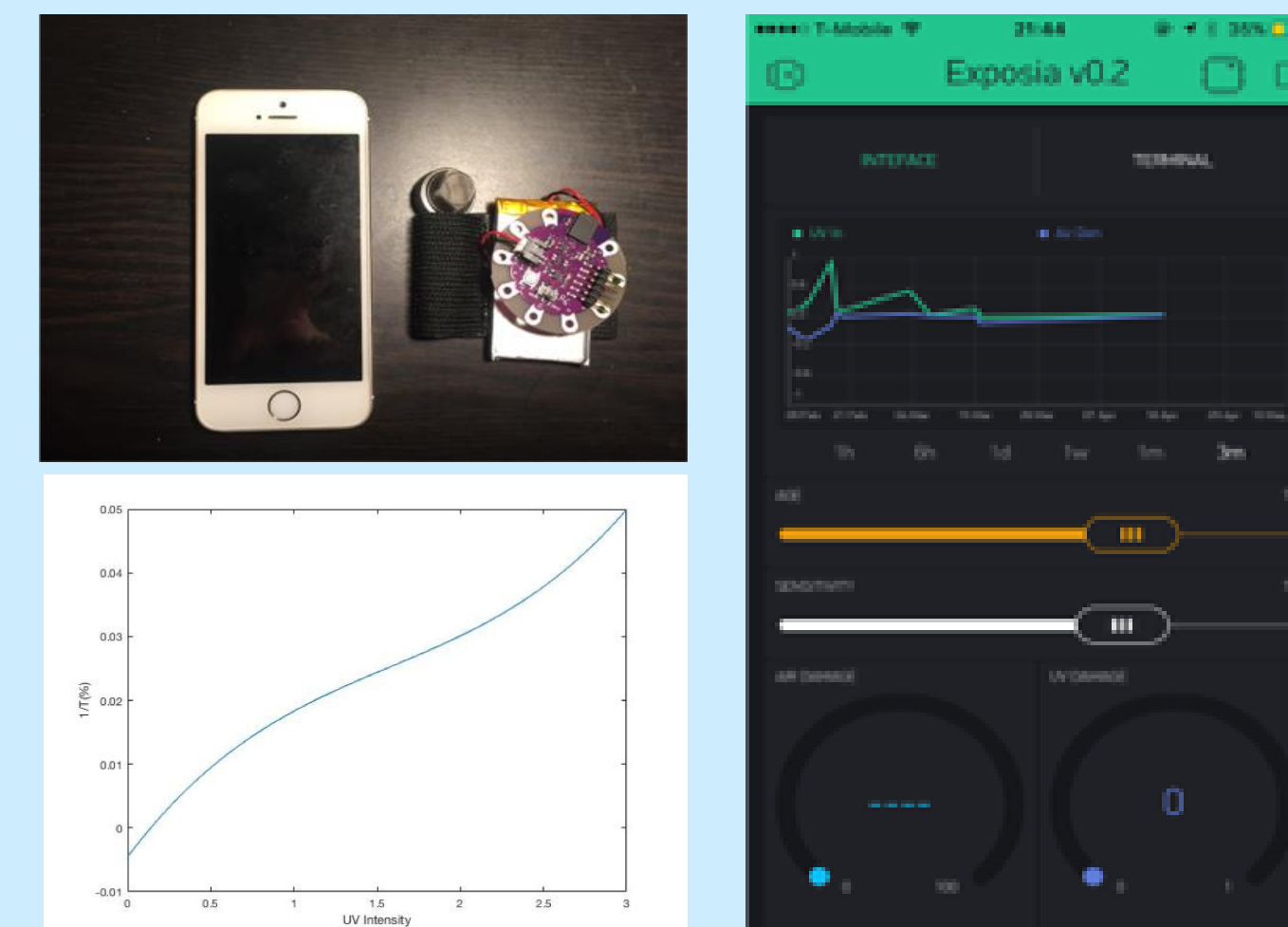
Conclusion

- 3 different Wearable Prototypes designed and manufactured, including 1 BLE version and 2 Wi-Fi versions;
- 2 iOS Apps that work with the prototypes developed;
- 1 Web-based Data Dashboard that works with the Wi-fi Prototypes established.
- Mathematic Models of UV Damage Dose and Air pollution Damage Dose built and implemented; 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

- Applications will be updated .
- Universal package will be developed.
- The analysis interface of the BLE prototype will be developed

Reference

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3. CliMate - https://www.kickstarter.com/projects/962920513/climate-create-your-own-friendly-environment/
4.UV Information - http://www.uv-damage.org/en/article/UV-Good-to-know/a3.aspx

Acknowledgement：