



## Goals

- ❑ Design a wearable for tracking the location of young children and their health status
- ❑ Create a phone application that shows the wearer's location and alerts users about unusual activity
- ❑ Integrate Google Calendar and Geofencing for a more autonomous user experience
- ❑ Deliver multiple options for tracking based on accuracy and battery efficiency

## Motivations

- ❑ Small children (ages of 3 - 5) are often too young to have their own phones yet guardians should be able to have a medium of contact
- ❑ Provide a cost efficient solution for parents/guardians to keep track of the child's location
- ❑ Utilize sensors which pushes the project beyond basic applications (simply tracking)
- ❑ Add features that improve on existing devices
  - different methods of location tracking
  - convenient geofencing

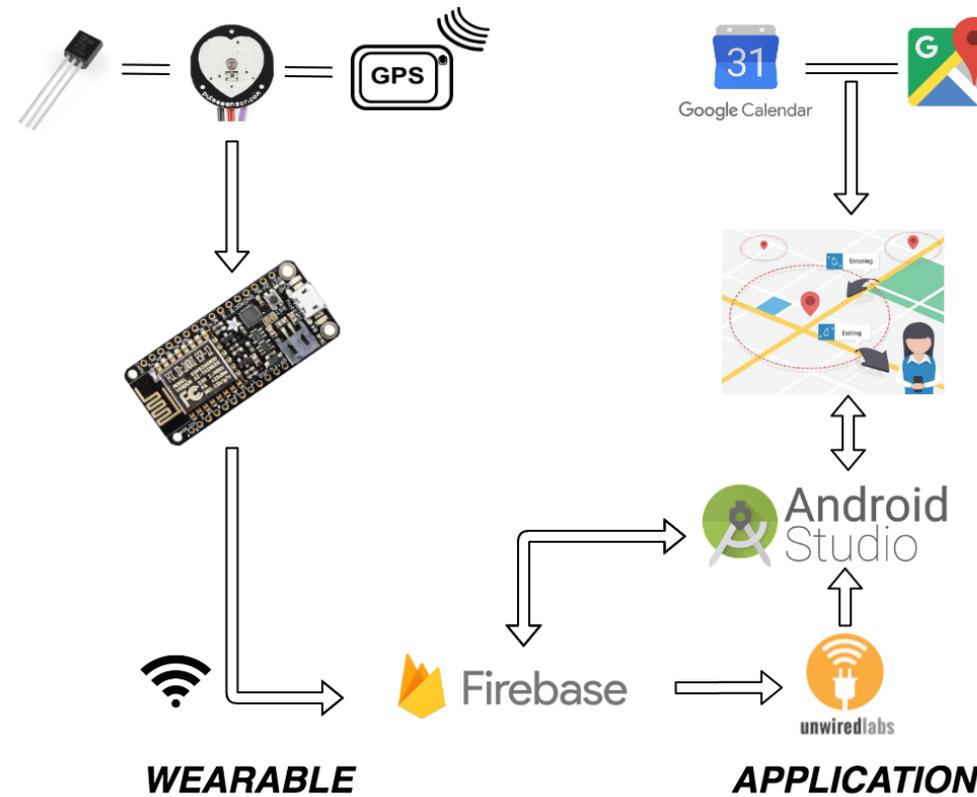
## Acknowledgements

We would like to thank our advisors Dr. Hana Godrich and Dr. Marco Gruteser for their guidance along with the ECE Department for their generosity. Thank you to our families who have supported us throughout our college careers.

## References

- [1] <https://developers.google.com/maps/>
- [2] <https://unwiredlabs.com/docs#geolocation>
- [3] <https://firebase.google.com/docs/>
- [4] <https://pixabay.com/en/pedestrian-crossing-traffic-sign-160672/>

## Methodology



### WEARABLE

- ❑ Adafruit Feather Huzzah microcontroller is the central component of our device
- ❑ Temperature and heart rate sensors track vitals
  - Readings combined to sense tampering
- ❑ Adafruit Ultimate GPS FeatherWing has position accuracy of 1.8 meters
- ❑ Arduino IDE used to program microcontroller
- ❑ Transmits information to Firebase database via Internet connection
  - GPS location
  - BSSIDs of nearby WiFi routers
  - Sensor readings

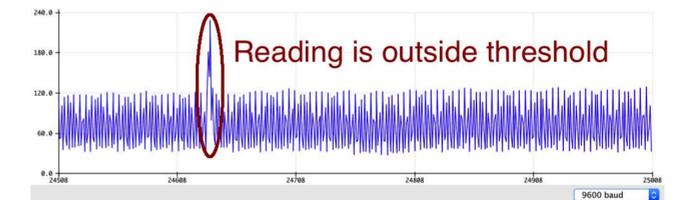
### APPLICATION

- ❑ Retrieves information from Firebase and displays in user interface
  - Notifies user of unusual readings
- ❑ Runs BSSIDs through Unwired Labs API which returns wearable coordinates
- ❑ Java used in Android Studio to program application
- ❑ Utilizes Google APIs for geofencing
- ❑ Integrates Google Calendar for automatic geofencing
  - Addresses are geocoded for marker location
  - Event start and end times are used to calculate marker duration

## Results

### WEARABLE

- ❑ Achieved accurate sensor readings given unusual logic states
- ❑ Set thresholds for when application should send alerts
- ❑ Established connection between wearable and Firebase
- ❑ Successfully sent readings to Firebase periodically



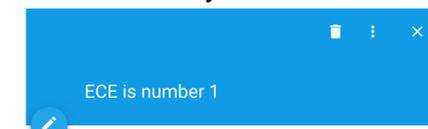
temperature-test-2cefd

```
logs
message: "Our readings are as follows:"
temperature: 75.49758
```

**Above: Heart rate sensor reading**  
**Left: Temperature reading in Firebase**

### APPLICATION

- ❑ Created Android Based Application that utilizes Google and Unwired Labs APIs for determining wearable location
- ❑ Retrieved data successfully from Firebase and displayed in application
- ❑ Implemented geofencing manually and automatically



Friday, April 20  
4:00pm - 5:00pm  
Livingston Apartments Building B  
105 Joyce Kilmer Ave, Piscataway Township, NJ 08854, USA  
Good Samaritan

**Above: Google Calendar event**

**Right: Orange – geofence marker, Red – user location marker**

