

Snow-Sense

Automating Sensing & On-Demand Service Fulfillment

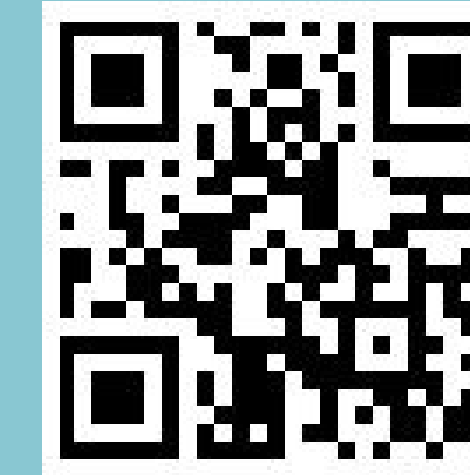
PROJECT DESCRIPTION

This project applies the concept of the Internet of Things (IoT) to aid homeowners in monitoring snow build-up on their properties, and allowing them to automate snow removal service requests.

USES & APPLICATION

- Requesting snow removal services from other app users through smart devices.
- Monitoring snow totals in the homeowner's property on the go from anywhere with an android device & internet connection.
- Automating snow removal service requests based on sensor data.

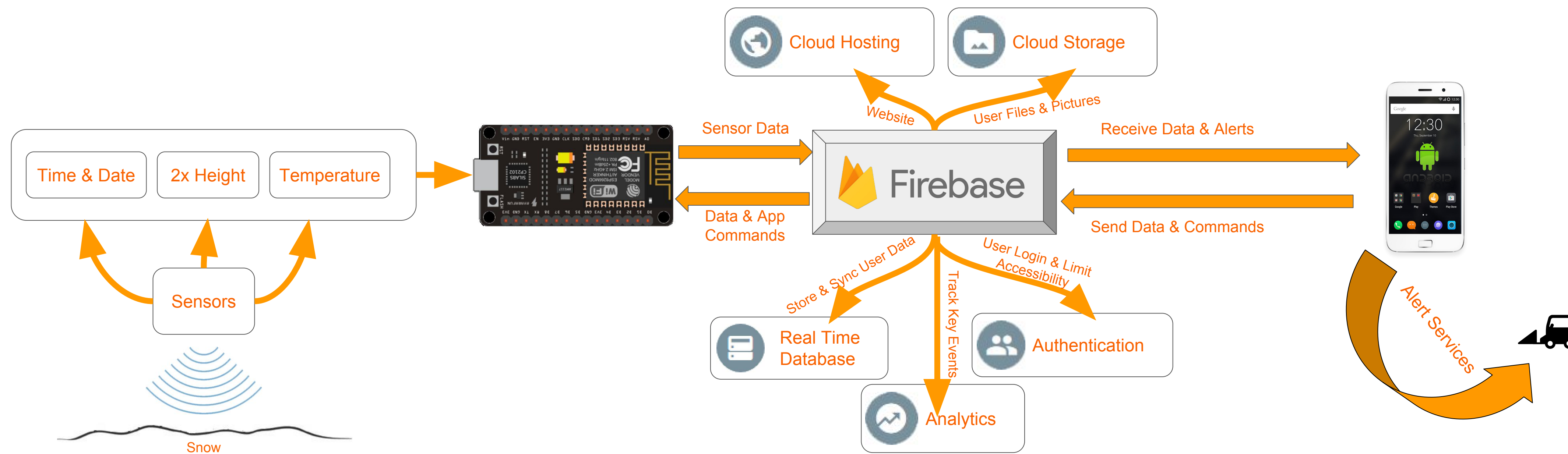
QR - CODE



MANDATED TECHNOLOGY

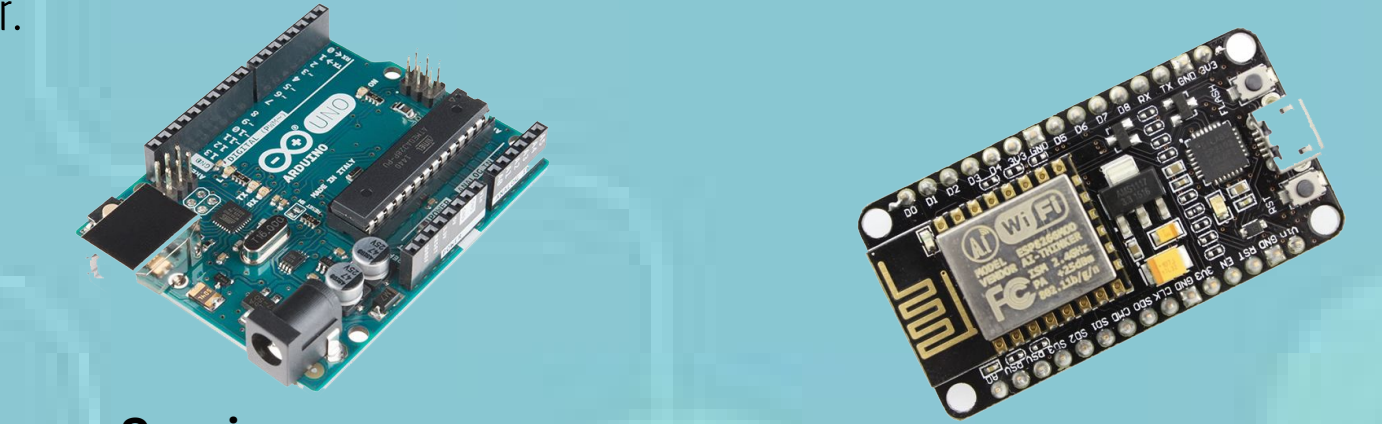
- Keeping manufacturing price down by using low cost components and open source software in order to make it affordable to homeowners.
- Both Firebase(backend) and Android(frontend) are in constant development, requiring the developer to be aware and familiar with the latest SDK changes.
- Device has to be capable of withstanding below freezing temperatures over long periods of time.
- Safe materials in accordance with NESC and IEEE.

SYSTEM ARCHITECTURE



FUNCTIONALITY

- **NodeMCU Devkit**
 - Used instead of the project's initially targeted Arduino Uno, as it is much cheaper, includes a ESP8266 WiFi module and is smaller.
- **Ultrasonic Distance Sensing**
 - Used as the primary method of determining the height of snow by keeping track of an initial height, and current heights through snowfall.
 - A better alternative to infrared sensors. It is a linear device, has a longer range and is not affected by sunlight.
 - Two ultrasonic sensors, in addition to a temperature sensor were used in order to validate measurements and increase computation accuracy.
- **Firebase & Android**
 - Chosen as it is a free cloud service and contains plenty of documentation and features. Main features used include database, authentication, storage and analytics. Most of its features are accessed through an Android application.

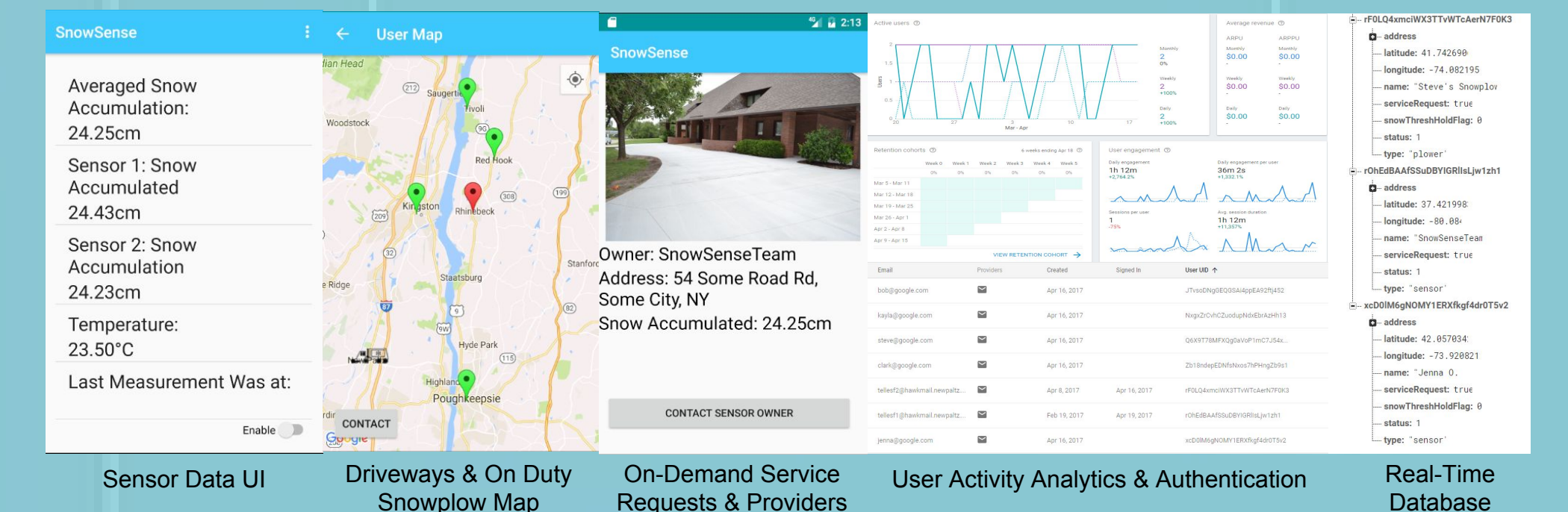
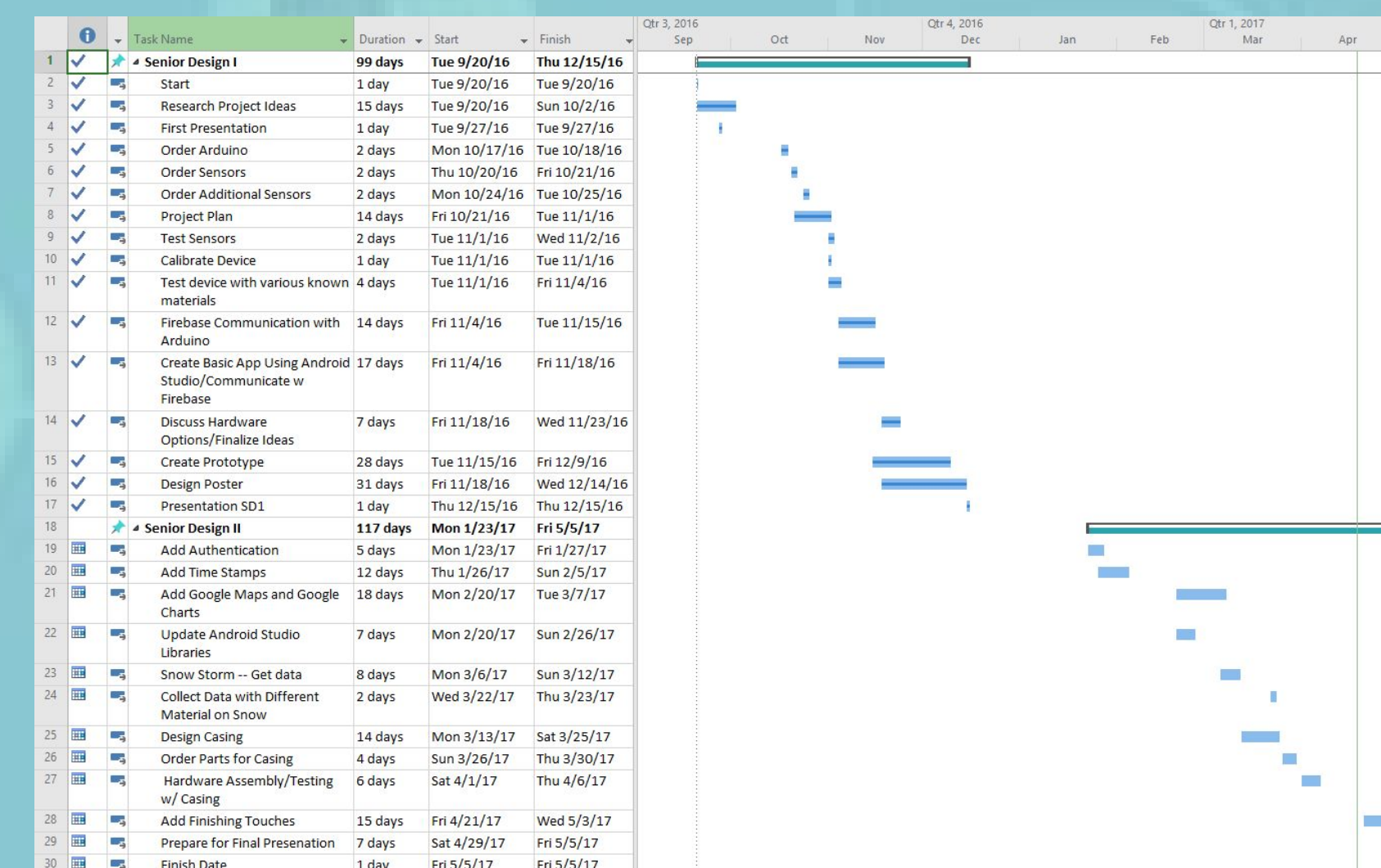


PEOPLE



Prof. Baback Izadi (Faculty Advisor) | Dr. Nitya Narasimhan (Industry Advisor) | Felipe Telles (Student) | Kayla Marchant (Student)

TIMELINE



Sensor Data UI | Driveways & On Duty Snowplow Map | On-Demand Service Requests & Providers | User Activity Analytics & Authentication | Real-Time Database

FUTURE WORK

- Obtain or develop higher quality and cost effective ultrasonic sensors capable of outputting sound waves of higher magnitude, increasing measuring range and measurement accuracy against soft objects.
- Obtain proper casing material and insulation to extend device's life expectancy.
- Switch to ARM based Microcontroller for improved hardware performance, ADC accuracy and additional features.