Dwight Look College of
# ENGINEERING
TEXAS A&M UNIVERSITY

CARdiac

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Project Goals: CARdiac is a remote patient monitoring system that can be placed in a vehicle and used to detect various hazardous situations to the vehicle's occupants. The idea of this project is to increase vehicle safety by sensing harmful situations and relaying them to an outside server, such as a hospital or police station, to speed up response time. The hazardous situations this project monitors are: heart irregularities, falling asleep at the wheel, and collision detection.

Collision Detection:
Collision detection is implemented using the LIDAR-lite range finder and a high sensitivity latching Hall Effect sensor. Distance measurements from the Lidar are used to produce relative velocity and acceleration between the user's vehicle and an object ahead. The Hall Effect sensor is used to calculate the user's velocity which is then used to calculate the vehicle's stopping time and distance based on deceleration capabilities of the vehicle. Kinematic equations are then used to determine if a collision is imminent.
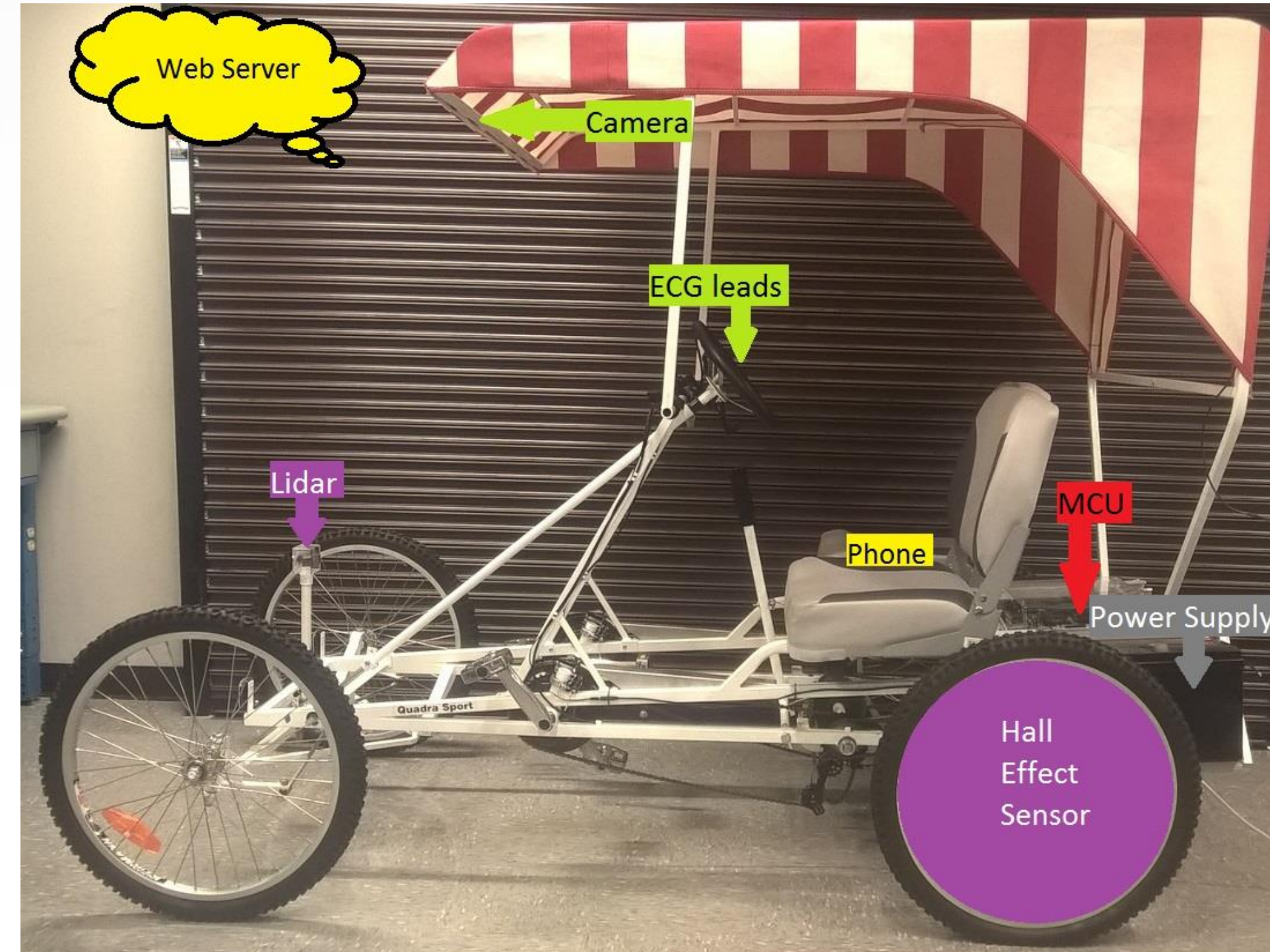

Heart Irregularities:
The raw ECG is filtered through the circuit, and is given to a peak detection algorithm. The peak detection algorithm filters the raw ECG signal to provide the r-peaks which can be used to calculate the heart rate, and determine whether or not there are irregularities with the heart beat.
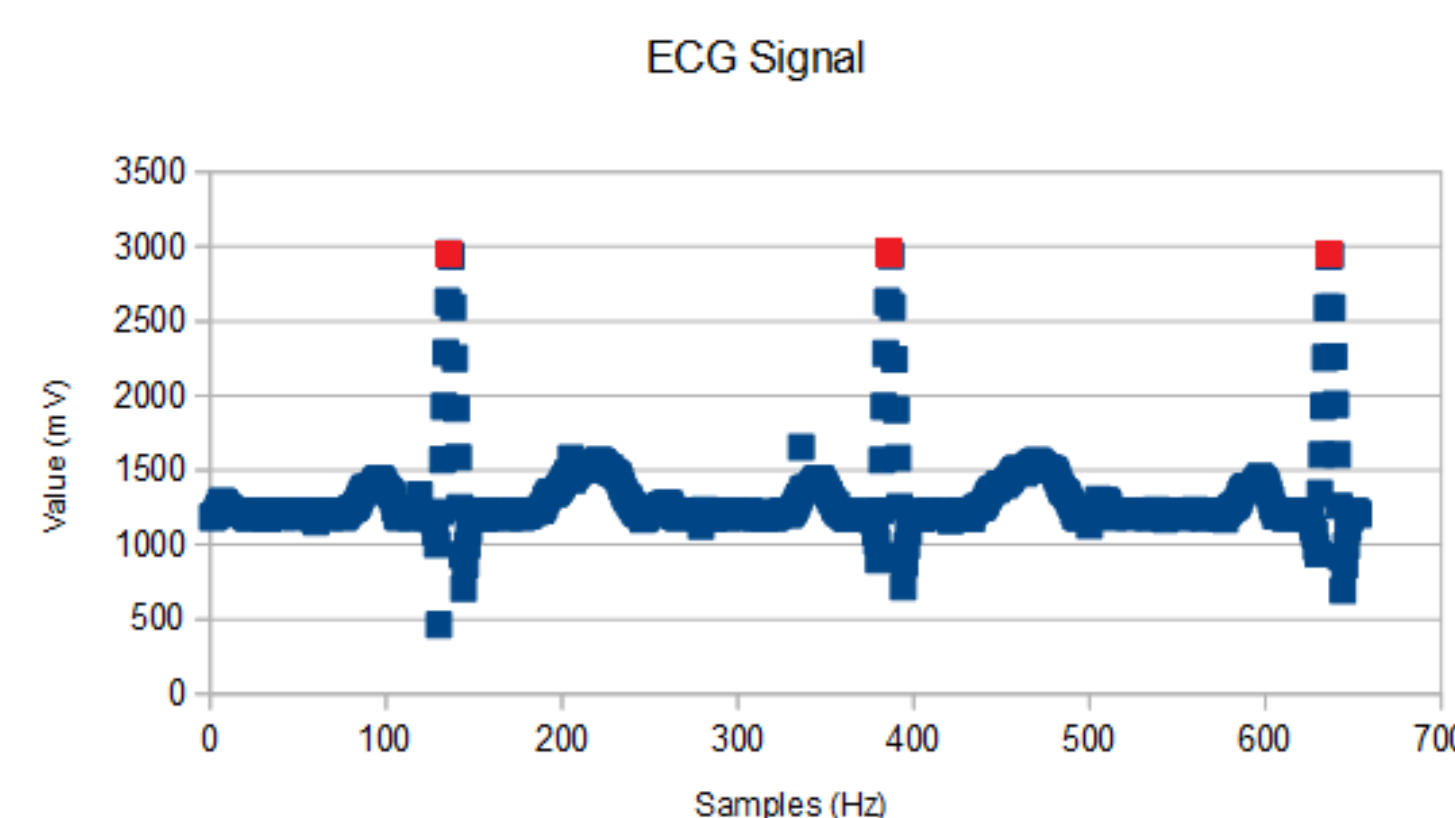

Electronics Forum (Circuits, Projects and Microcontrollers), 'Ecg Heart Rate Monitor Design', 2015. [Online]. Available: http://www.electro-tech-online.com/threads/ecg-heart-rate-monitor-design.89227/. [Accessed: 02- Apr- 2015].

Face and Eye Detection:

**Quadricycle Test Bed**
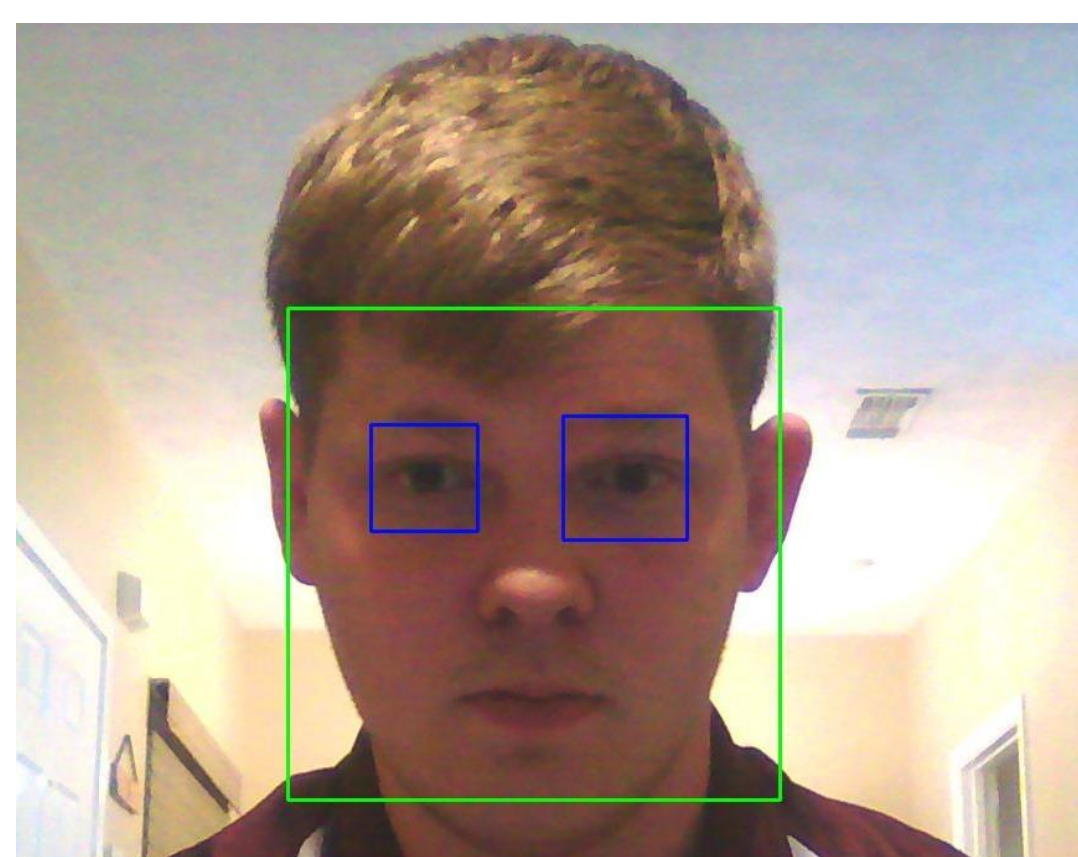
Control System:
The control system uses the data received from the mechanical and biometric sensors to determine if an emergency is occurring. Depending on the emergency that is detected, the control system sends a message via a Bluetooth module to an Android phone.
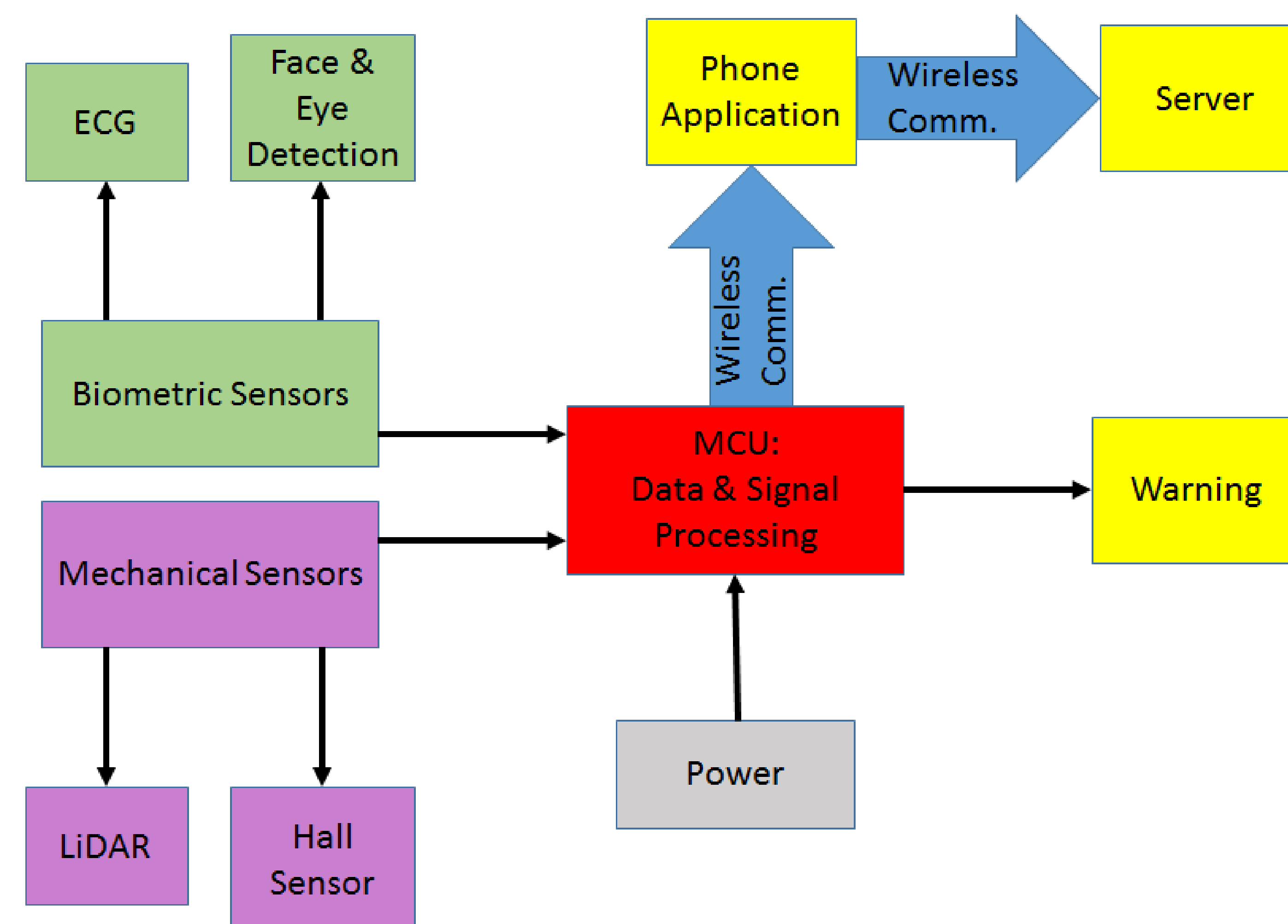
Block Diagram

Android Application:
The android application will be used to allow the user to interact with the Microcontroller(MCU). The application also transfers data from the MCU via Bluetooth to the server via a HTML/REST api.
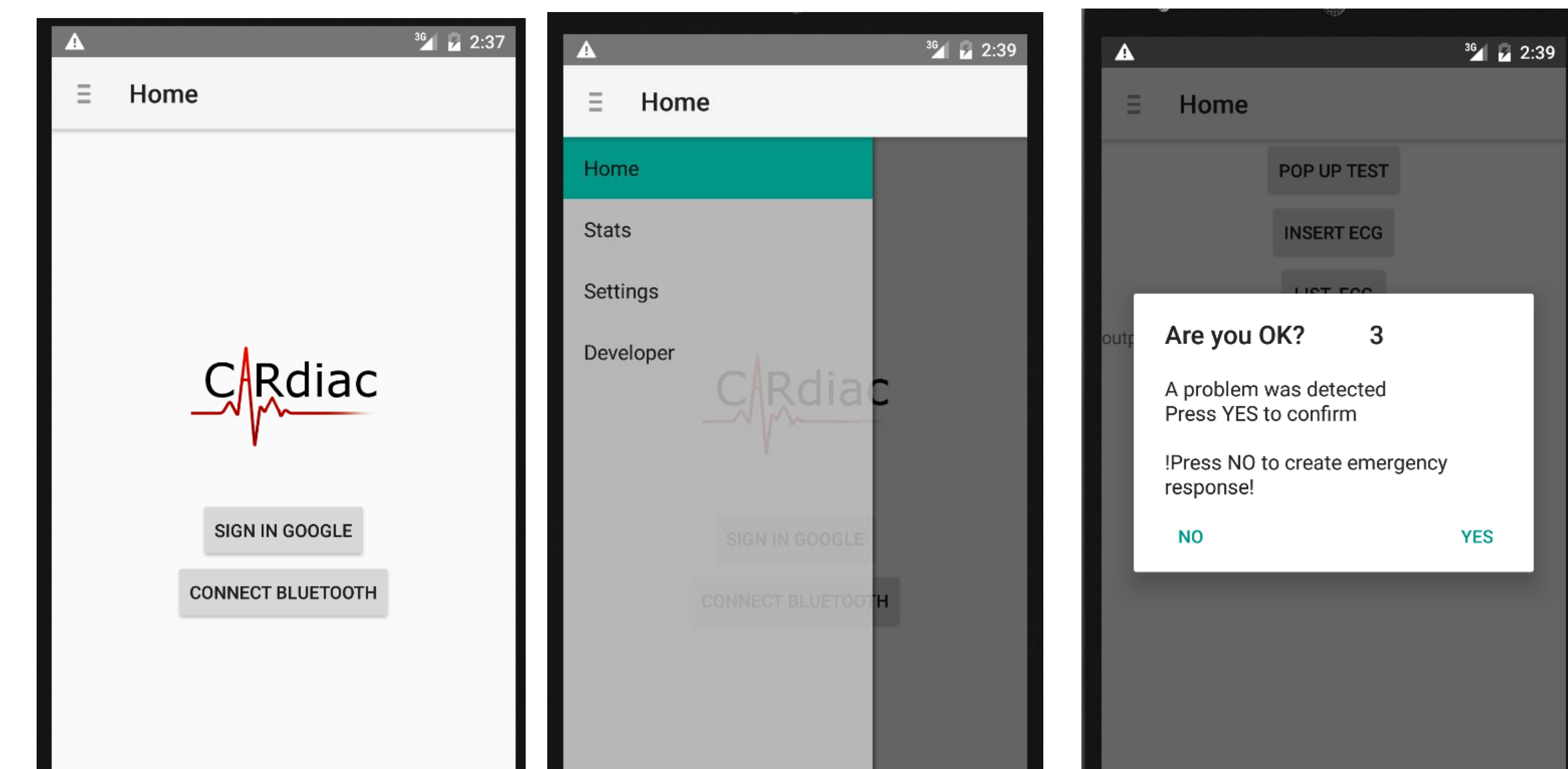
Server/Web Application:
The backend for the android and web application is Google App Engine. With GAE as the platform the server supports many features for enterprise web applications, such as a mail server, a non-relational database, user authentication and more.