**Project Name: EKG Monitor**

**Senior Design 1, Fall 2014**

**Group 22**

**Jeffrey Frye**

**Jonathan Gibson**

**Michael Sun**

**Cheng-Chieh Wang**

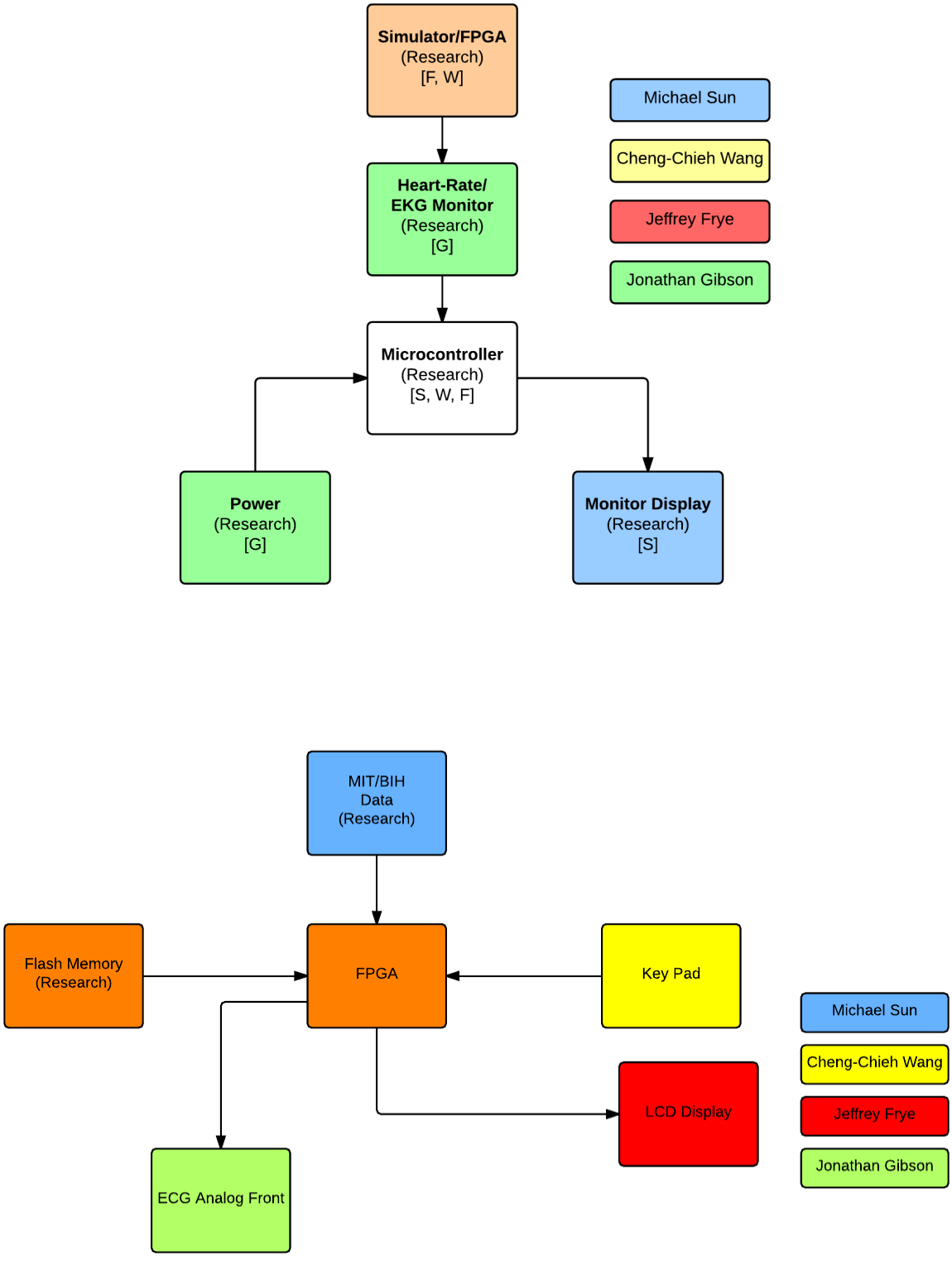
**Description**

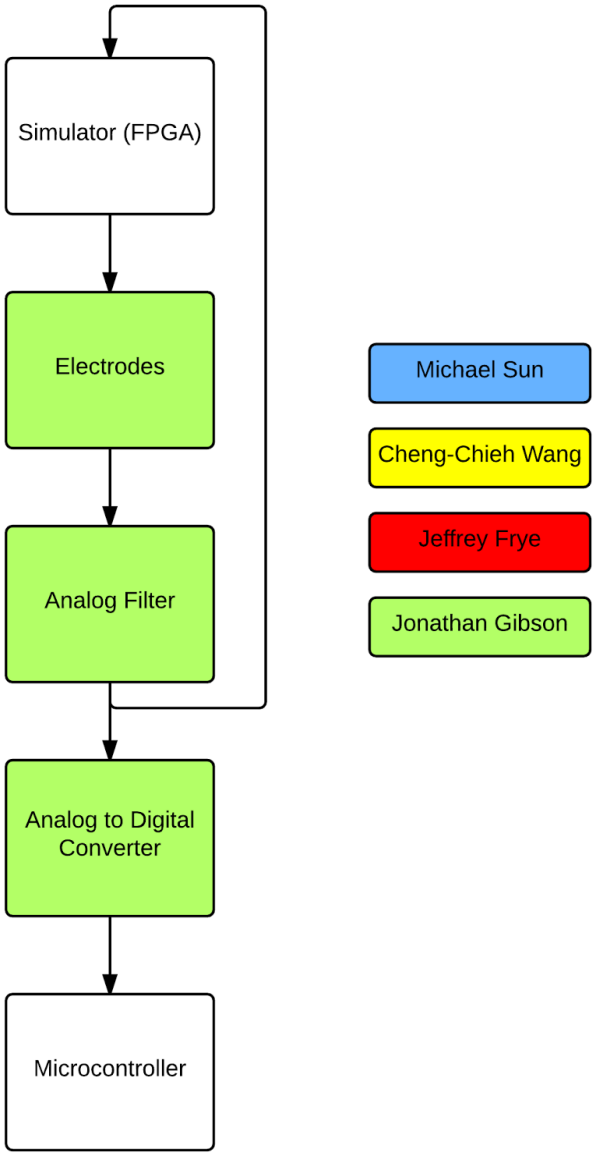
Medical professionals are increasingly getting busier and need tech solutions to make their jobs more manageable. Monitoring and recording vital signs is critical in the medical field. Doctors need to be able to record and store multiple patients data accurately and immediately. The old fashion way of using pen and paper to log data is no longer acceptable in the digital age.

The goal of this project is to use a portable device to monitor patients' heart rate and display a graph (aka. EKG). First, we will build a heart rate simulator using previous patients data imported from an online database. We need to use a simulator due to health and legal regulations regarding human testing. A microprocessor such as the MSP430 will handle the heart rate signals and allow the user to select from the different signals in the saved database using keypad and an LCD display. From the microprocessor, electrodes connected to an EKG Analog Front will filter the signal. An attached bluetooth module will transmit the signal to an Android phone or tablet to display the signal and its corresponding data using an Android application. The user will also be able to draw on the display and take notes.

The final product will allow users to monitor the patients heart rate and important data processed on a real time touch screen display. Users will be able to take notes/draw on the graph using the touchscreen display. The application will have a user friendly interface, probably with tabs at the top for displaying the heart rate, drawing/taking notes, and other features we may implement.

**Block Diagrams**


Simulator/FPGA
(Research)
[F, W]
Heart-Rate/
EKG Monitor
(Research)
[G]
Microcontroller
(Research)
[S, W, F]
Power
(Research)
[G]
Monitor Display
(Research)
[S]
Michael Sun
Cheng-Chieh Wang
Jeffrey Frye
Jonathan Gibson
MIT/BIH
Data
(Research)
Flash Memory
(Research)
FPGA
Key Pad
LCD Display
ECG Analog Front
Michael Sun
Cheng-Chieh Wang
Jeffrey Frye
Jonathan Gibson


Simulator (FPGA)
Electrodes
Analog Filter
Analog to Digital Converter
Microcontroller
Michael Sun
Cheng-Chieh Wang
Jeffrey Frye
Jonathan Gibson

**Specifications and Requirements**

| | |
|---|---|
| **Size** | **Approximately ( 1 foot X 1.5 foot )** |
| **Weight** | **Less than 15 lb.** |
| **Microcontroller** | **MSP430** |
| **Battery** | **Yes (few hours)** |
| **Touchscreen Display** | **Yes** |
| **Sensor** | **Electrodes** |
| **Software** | **Mobile App** |

**Budget and Financing**

| **Items** | **Price($)** |
|---|---|
| Microprocessor (MSP430) | 40 |
| LCD Display and Keypad | 40 |
| Bluetooth | 10 |
| Power Supply/ Battery Back-up for simulator | 20 |
| Electrodes | 20 |
| Miscellaneous Circuit Components including PCB design | 70 |
| **Total** | 200 |

**Project Milestones**

**Fall 2014**

- September
    - 09/09 Initial project document Due
    - 09/13 Finalize project idea (after meeting with Dr. Richie)
    - 09/20 Research for parts and necessary items
    - 09/27 Purchase a suitable FPGA development board
- October
    - 10/2 Simulator Research
    - 10/11 Touchscreen Research/ Software Research/ EKG Research
    - 10/18 Software Research/ EKG Research
    - 10/25 Be familiar with FPGA board/ Power source Research
- November
    - 11/01 Final design specification
    - 11/22 Finish Research Paper

**Spring 2015**

- December
    - 12/01 Purchase all necessary parts
- January - Start write code and work on prototype
- February - Troubleshooting
- March - Testing and integration
- April - Final Paper/ Presentation