



# ***E-Band***

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# Introduction & Motivation

- Focus - Epilepsy
- Seizures are a result of epilepsy
- *E-Band* measures three factors
  - Heart rate
  - Muscle tension
  - Falling
- Early notification system can help

**EPILEPSY**  
AT AN ALL TIME HIGH IN THE U.S.

**THE NUMBER OF PEOPLE WITH ACTIVE EPILEPSY, 2015**

3 MILLION ADULTS

1.2% OF THE POPULATION (3.4M)

470,000 CHILDREN

RECENT SEIZURES OR TAKING EPILEPSY MEDICINE

**EPILEPSY:** a brain disorder leading to recurring seizures.  
Learn more about seizures and epilepsy at [www.cdc.gov/epilepsy](http://www.cdc.gov/epilepsy).

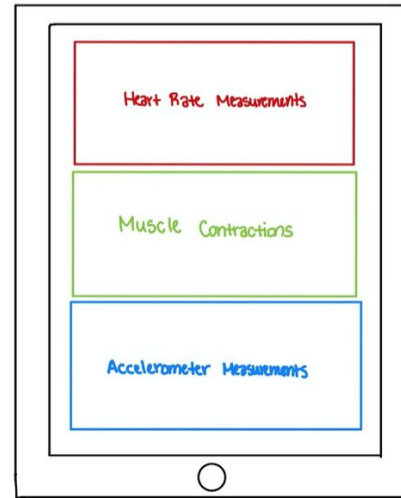
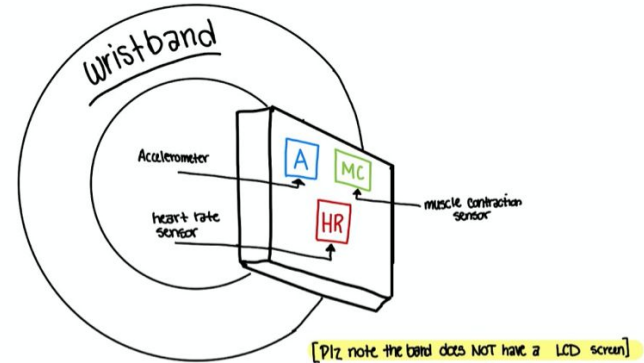
U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention

Zack BM, Kobau R. National and State Estimates of the Numbers of Adults and Children with Active Epilepsy — United States, 2015. *MMWR* 2017, in press.

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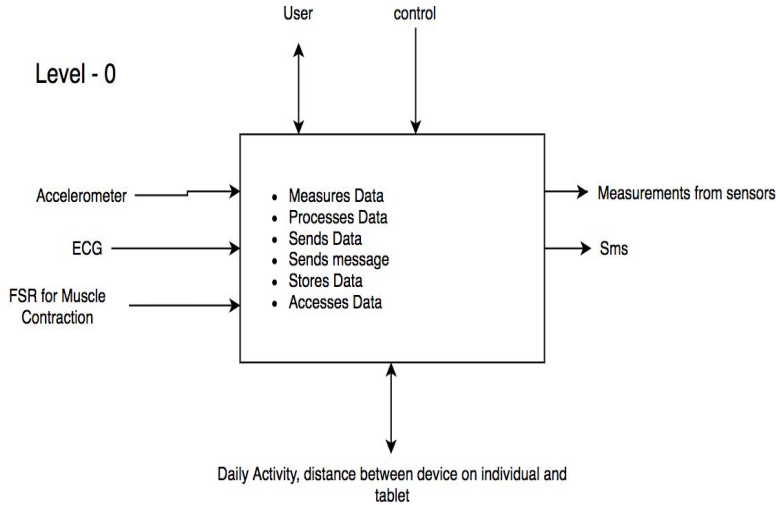
# Requirements

- Threshold
- S.O.S. Notification
- Master Bypass
- Physiological Monitoring Display (Tablet)
- Wireless Device w/ Adequate Battery Capacity
- LCD

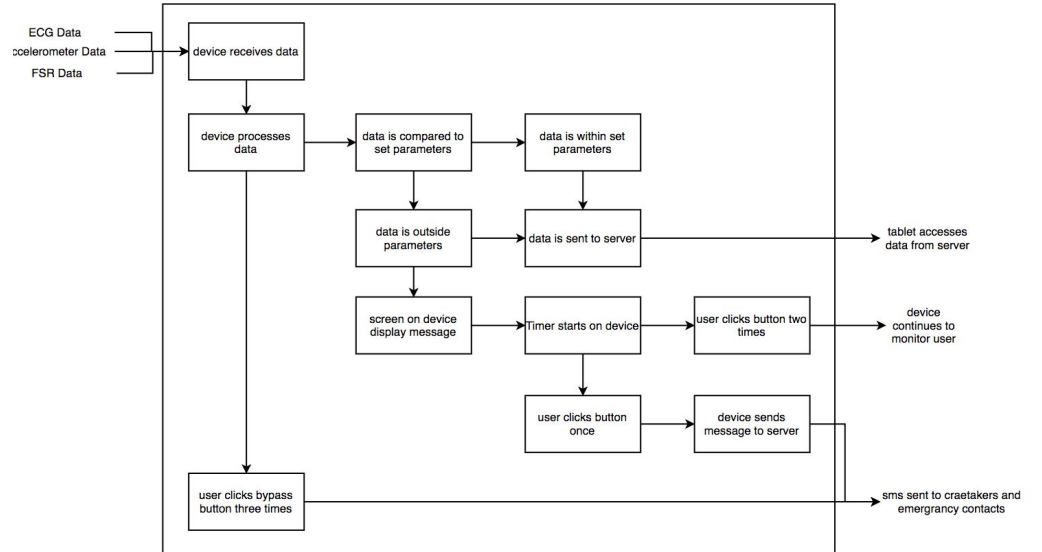


# Functional Architecture

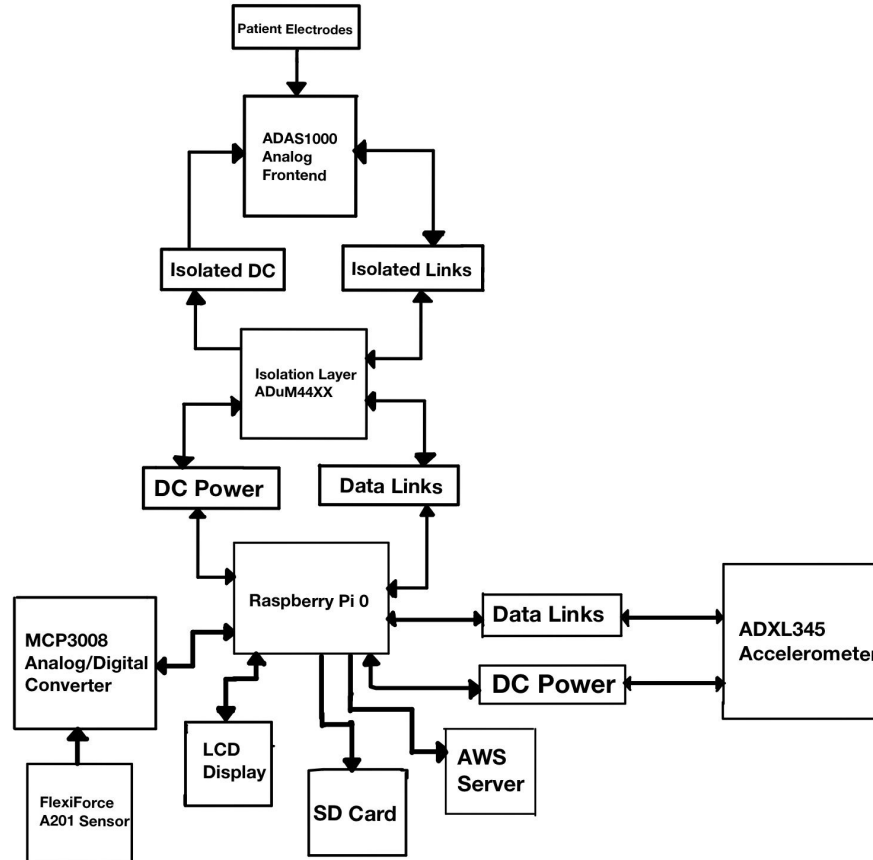
Level - 0



Level - 1



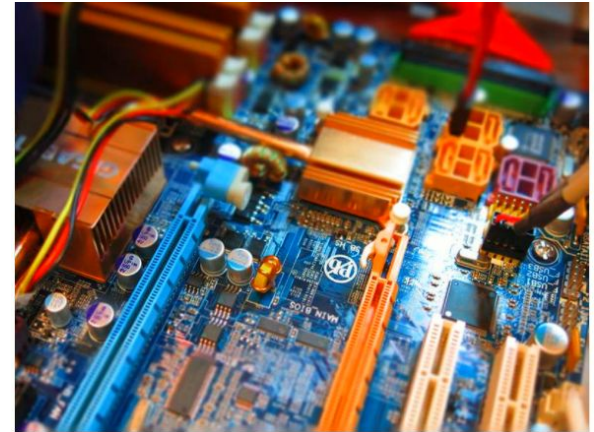
# System Architecture



# Main components, Roles, and Interfaces.

- **ECG:** measure heart rate(SPI)
- **Accelerometer:** measure acceleration (I2C)
- **FSR Muscle Contraction:** measures the pressure/power (I2C or SPI)
- **LCD Screen:** display a notification (I2C)

\*All devices use either or one of the following communication interfaces: I2C, SPI, One wire



<https://www.britannica.com/list/5-components-of-information-systems>

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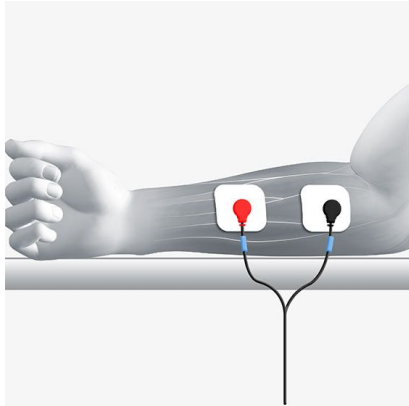
# Challenges

- Ultimate Design Failure
- Potential Device Fragility
- AWS Errors



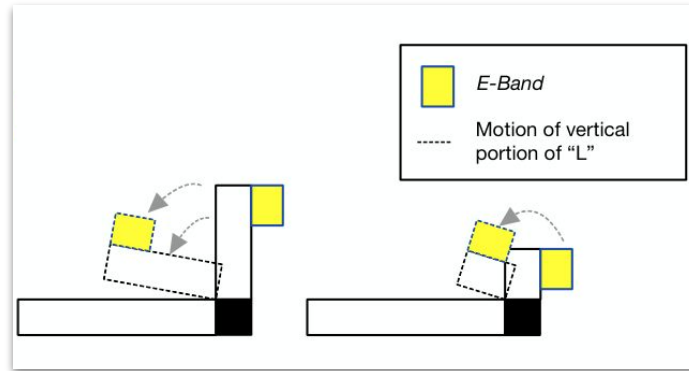
<https://wisdlabs.com/blog/challenges-enterprise-application-development/>

# Experimentation



<https://www.comrex.com/electrode-placements/flexor-wrist-fingers>

Muscle contraction test  
via TENS unit



Fall Test



[https://www.barnesandnoble.com/?i=CATAL\\_P&I=EM\\_P&P=51&SE=pxvnt&E=pxvnt&health\\_61927m](https://www.barnesandnoble.com/?i=CATAL_P&I=EM_P&P=51&SE=pxvnt&E=pxvnt&health_61927m)

Heart rate test via pulse  
oximeter





# List of Tasks and Allocation of Responsibilities

<b>Eric &amp; Albin</b>	<b>Padmini &amp; Bradley</b>	<b>Andrew</b>
Accelerometer	ECG Sensor	Muscle Contraction Sensor
Analyze accelerometer data	Analyze the ECG sensor data.	Analyzing the muscle contraction data



# Team Member Skills

Albin:

- C
- Python
- Matlab
- Research experience
- Soldering

Padmini:

- C
- Python
- Java
- KiCad
- MagicDraw & Cameo Systems Modeling
- Soldering
- Linux

Andrew:

- KiCad
- Python
- Manufacturing
- Soldering

Eric:

- C
- Python
- Matlab
- Soldering

Brad:

- C
- Python
- Linux

# Extra Skills/Knowledge Required

- **Skills**

- Interface E-Band to AWS
- Interface Raspberry Pi 0 to Screen Display
- Effectively Measure Physiological Data

- **Knowledge**

- Programming to AWS Server
- Programming Raspberry Pi 0
- Precise Locations for Peak Physiological Data Acquisition



<https://www.allbluesolutions.com/blog/improve-your-technical-skills-here-are-the-ways/>



# Question

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