Sensor Board

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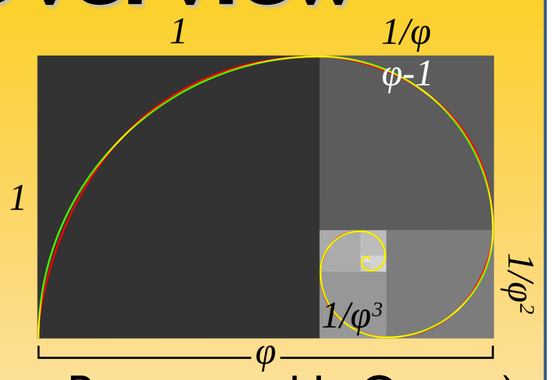
EE391 Class Project

EE391: EE Design & Testing
Term Poster: March 22nd, 2017
Prof. Taylor, Kettering University

Project Overview



Inputs:
- Accelerometer Data
- Thermistor Data
- Push Button

Outputs:
- 7 Segment Display (X, Y, Temp, Programmable Output)

Design Considerations:
- 7 Segment Display at Top for Readability
- iPhone 5S Width
- Length = (Golden Ratio = 1.618) * Width
- Tactile Switch located in iPhone home button position
- USB on bottom left corner

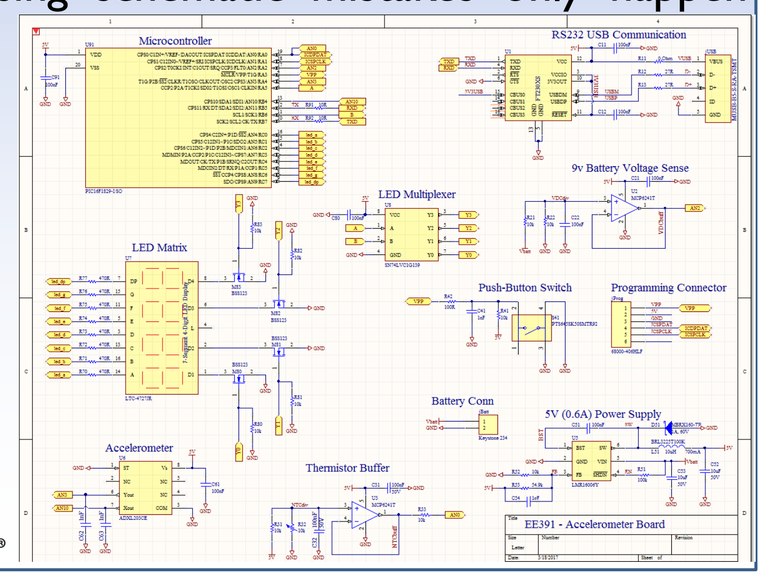
Project Interest:
- Right size project for 10 week term
- Sensors common in consumer hardware (e.g., Fitbit)
- Finding problems hardware can economically solve takes a lot of practice building things first (e.g., Square)

Schematic Design

Schematic:
- Clean schematic documentation is essential for teams

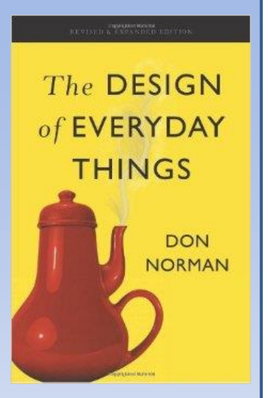
Lessons Learned:
- New product development in hardware requires an understanding of systems that are comprised of the fundamental components that you can later fit together like a puzzle at the system level
- Most embarrassing schematic mistakes only happen once!
- You'll never make or forget those mistakes again after the PCB gets built! ☺

Altium Designer®



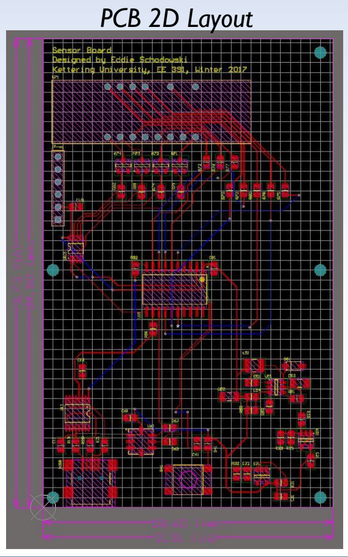
Printed Circuit Board Layout

Routing:
- Real engineering design; like a puzzle for electrons! No solutions, only trade-offs.
- *"Great artists ship."*
- Important to storyboard out user experience so hardware fits ergonomically into use case
  - e.g., button placement, LEDs, etc.

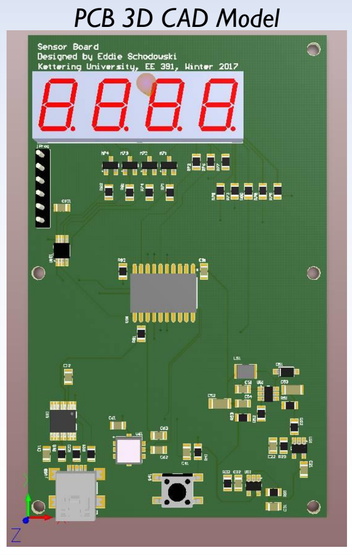


Assembly / Board Population:
- Takes practice ☺

PCB 2D Layout



PCB 3D CAD Model



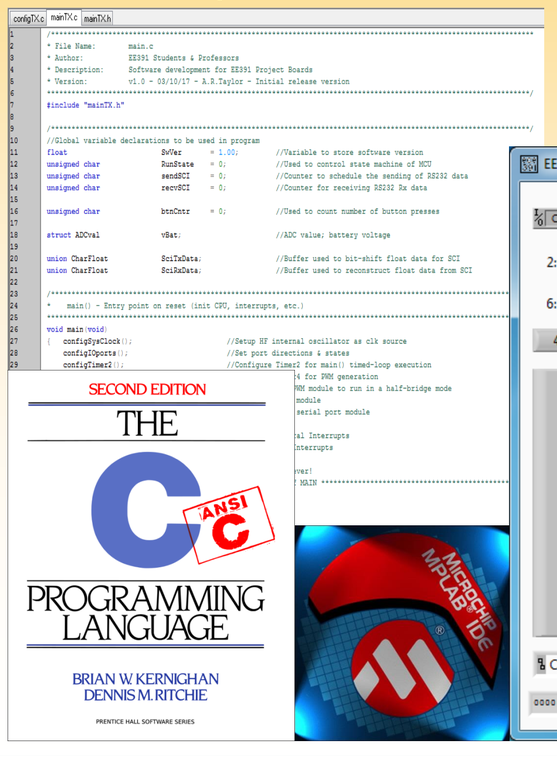
Actual Assembled PCB

MCU Software / GUI

Software:
- It's worth deeply understanding C and Micros. *Takes time.*

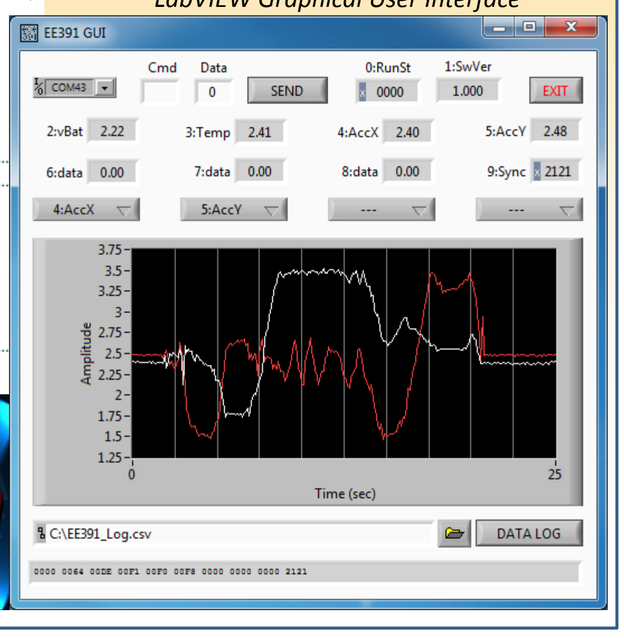
GUI:
- How can your GUI design teach you something useful about your hardware capabilities in the real world?
- Okay, after you've built it, how do you test it?

MPLAB Software Environment



NATIONAL INSTRUMENTS LabVIEW

LabVIEW Graphical User Interface



Acknowledgements

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