PIRM - Dec21-18:
Interactive, Batteryless Handheld Game

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Background

- Handheld batteryless gaming device
- Device powered through human interaction
- Game incorporates power harvesting
- No need to have charging accessories/batteries
- Dungeon Crawler style gameplay
- Multiplayer capabilities

Conceptual

- E-ink Display - low power

- DIP Switches - decision making

- Energy Harvesting Devices - power
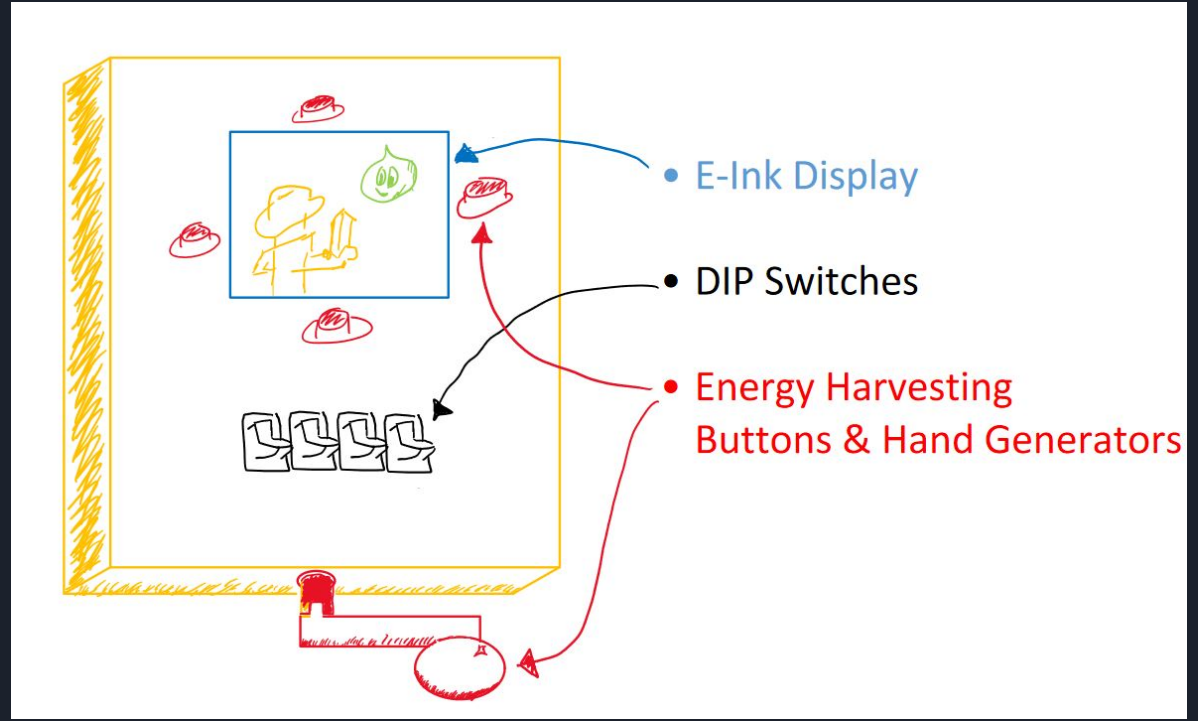
Functional Diagram
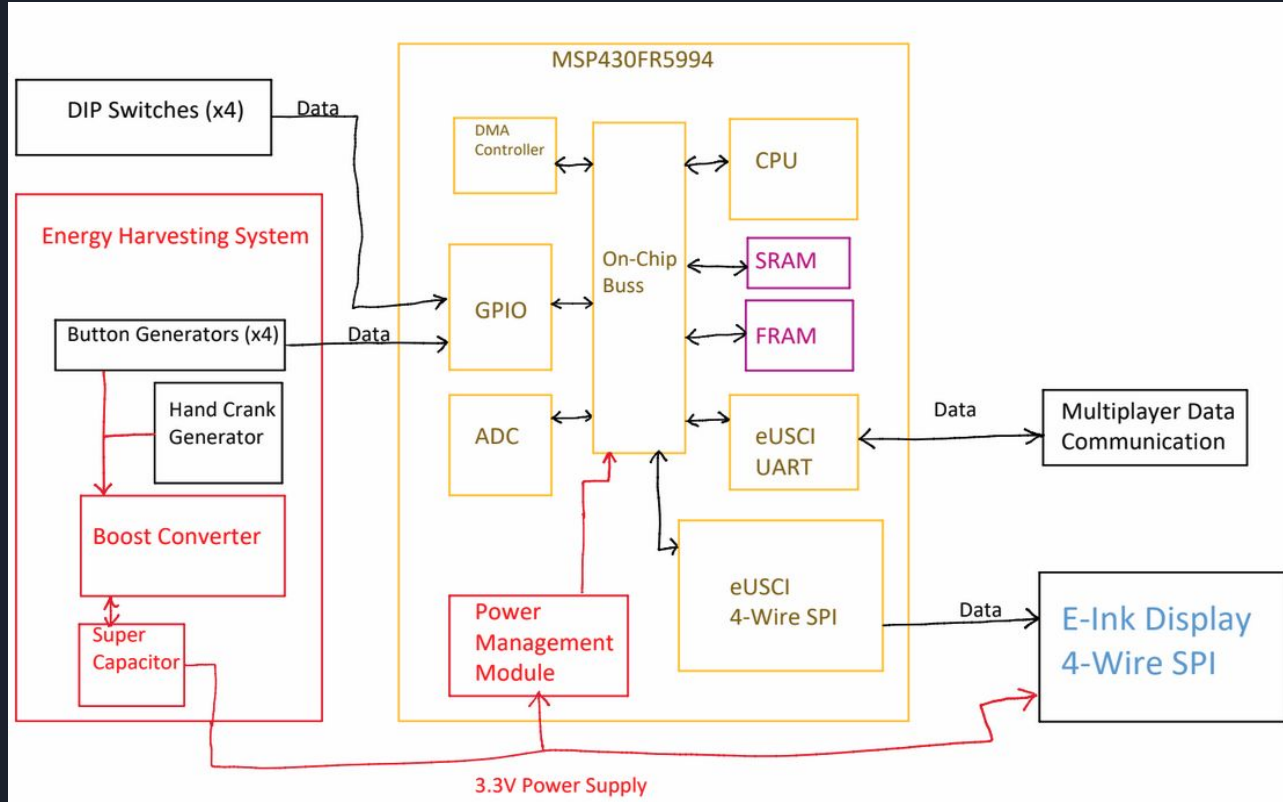
Project Goals - Fall Semester

Hardware:

- Successfully harvest energy and store in supercapacitor
- Successfully power system off of supercapacitor
- Successfully power system solely off of human interaction

Software:

- Have software and hardware integrated
- Have multiplayer working
- Successfully go through a main gameplay loop
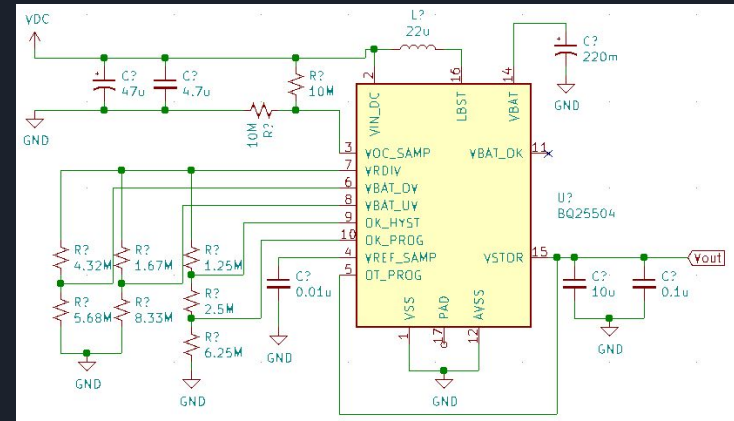
Power System Progress

- Mapped out Piecewise Schematic

- Ordered parts/boards to begin testing

- Ensure component functionality

- Ensure component compatibility
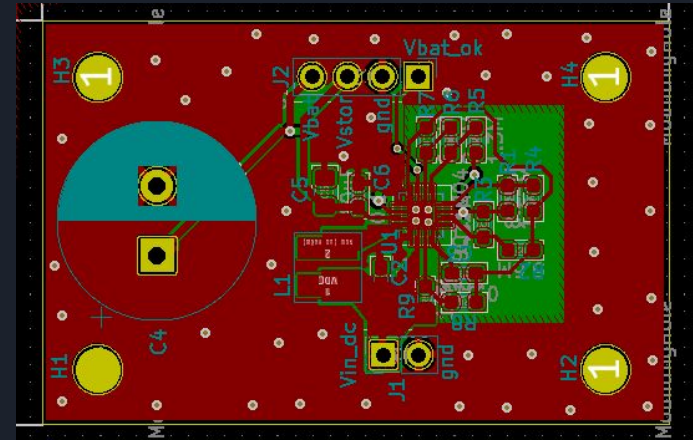
BQ25504 module pcb
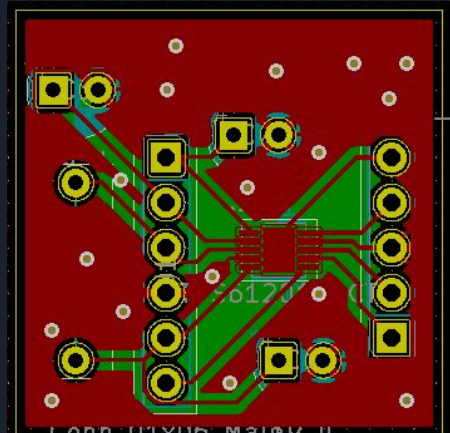
TPS610994 module pcb

BQ25504 module schematic

Hardware Challenges

Goals:

- Harvest Energy
- Store Energy
- Produce Power

Challenges:

- Multisource power supplies management
- Hand Crank power balance
- Efficient button power generation
- SMD soldering

MSP430 MCU Progress

Stage 1:

- SPI Software Interface Creation:
    - MSP430 GPIO pins
    - C programming language

- Waveshare E-Ink Display Configuration:
    - 4-pin+ configuration for SPI
    - Open source libraries for some specific devices

Goal:

- Program the E-Ink display with graphics for the game through software.

Challenge:

- Writing our own library files to use the E-Ink display with the MSP430

Software Progress

- Technical challenge:
  - API for the software and hardware is being developed at the same time
  - Changes may need to be made, refactoring is costly in terms of time
- Code is kept as abstract as possible
- Major values are easily refactorable
- Room Challenges are ready to be tested
- Current Goals: Boss fights and looping room challenges