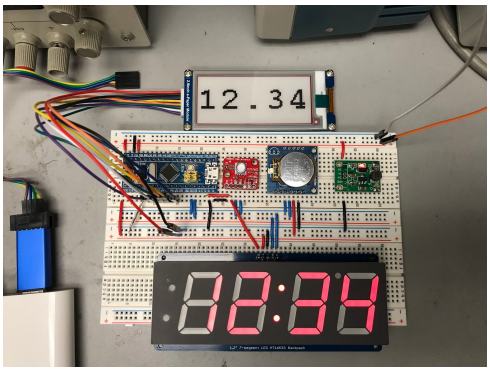
S.I.T. Milestone Report

Completed Milestones

We are building a waterproof device that could measure and display depth information.
We anticipate to have two iterations during this quarter. In each iteration, we are building one deliverable and testable prototype. During these 4 weeks, we've build the first fully integrated prototype. It has depth sensor, LED display, E-ink display, real time clock and battery monitor system. The device is reprogrammable and rechargeable. We've already tested it in a swimming pool, recorded videos to compare the performance of two different kinds of displays.

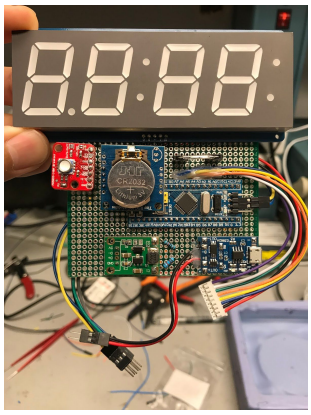
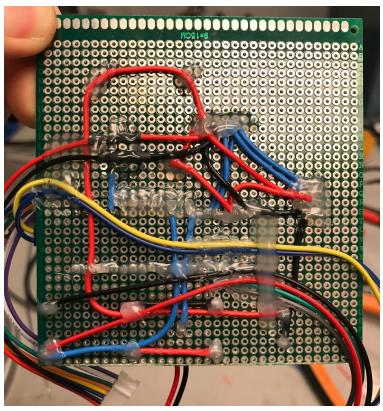
The milestones during the development process are decomposed as follows.

1. Hardware Design (Liren Chen)
    a. Figure out a full list of materials needed for development, including modules and other essential tools (10h)
        i. Priority: High
        ii. Completion date: 4.30
    b. Build experimental prototype on breadboard (6h)
        i. Priority: High
        ii. Completion date: 5.3



    c. Design power modules: battery, battery monitor system (3h)
        i. Priority: Medium
        ii. Completion date: 5.6
    d. Design On/Off trigger (2h)
        i. Priority: Medium
        ii. Completion date: 5.7
    e. Solder water resistant plug (2h)
        i. Priority: High
        ii. Completion date: 5.8
    f. Build prototype with soldering board (10h)

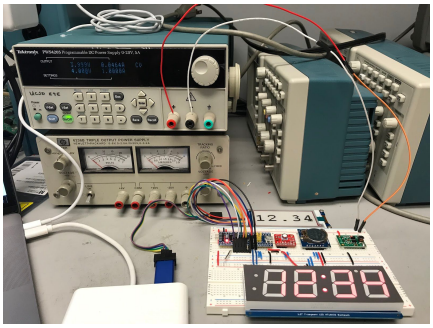
i. Priority: High
ii. Completion date: 5.9

g. Potting the device with epoxy resin (6h)
   i. Priority: High
   ii. Completion date: 5.10-5.13

2. Software Design (Xuanyi Yu)
   a. Configure the complete development environment for STM32 (5h)
      i. Priority: High
      ii. Completion date: 4.23
   b. Coding for GPIO, USART (3h)
      i. Priority: High
      ii. Completion date: 4.26
   c. Coding for I2C, SPI interfaces (5h)
      i. Priority: High
      ii. Completion date: 5.1
   d. Coding for basic modules: LED display, depth sensor (6h)
      i. Priority: High
      ii. Completion date: 5.3
   e. Coding for standby logic (3h)
      i. Priority: High

        ii. Completion date: 5.5
    f. Coding for addition modules: E-ink display, RTC (10h)
        i. Priority: Medium
        ii. Completion date: 5.7
3. Testing (Liren Chen)
    a. Test each module on breadboard: battery, BMS, step-up, displays, sensors (5h)
        i. Priority: High
        ii. Completion date: 5.3
    b. Test power consumption for running status & standby status (3h)
        i. Priority: High
        ii. Completion date: 5.7



    c. Test reed switch and standby logic (2h)
        i. Priority: High
        ii. Completion date: 5.7
    d. Test user logic and integral functionality on breadboard (2h)
        i. Priority: High
        ii. Completion date: 5.8
    e. Test potted prototype in the lab: charging, ON/OFF, displays (5h)
        i. Priority: High
        ii. Completion date: 5.13
    f. Test potted prototype underwater, record video for underwater display (5h)
        i. Priority: Medium
        ii. Completion date: 5.13, 5.16

4. Documentation (Samuel Givens)

a. Set up project repository (1h)
    i. Priority: High
    ii. Completion date: 5.7
b. Write project wiki (2h)
    i. Priority: High
    ii. Completion date: 5.13
c. Prepare for 3 min presentation (3h)
    i. Priority: High
    ii. Completion date: 4.16

The above milestones are all accomplished. We need to get B if we only have a prototype on breadboard. We could get A if we have a prototype that could work in the water.

During the developing process, we did borrow some design ideas from the previous group working for coral reef project. Since the previous one doesn't work, and it's nearly impossible to figure out the exact reason for it. We nearly develop everything from scratch to make sure we have something actually works at each milestones.

Generally, we were spending nearly 30 hours/week during the past 4 weeks.

Future Milestones

We are planning to build the second prototype during the rest of the quarter. Generally, we'd like to make several improvements compared with the first one. The design decisions for the second prototype largely depend on the test results of the first one. Because of more complexity, more uncertainty is inherited in the second iteration. We may change the plan during our development.

The minimum goal is to build the second prototype with data logging and transmission. (for B or A-)

The optimum goal is to make the second prototype with data logging, data transmission, much better waterproof capability and more robustness. (for A or A+)

1. Hardware Design (Liren Chen)
    a. Design Wireless charging module (6h)
        i. Priority: Medium
        ii. Completion date: 5.24
    b. Design PCB for depth sensor breakout (6h)
        i. Priority: High

        ii. Completion date: 5.17
    c. Design PCB for main board for the device, including power cut-off for peripherals (10h)
        i. Priority: High
        ii. Completion date: 5.17
    d. Design waterproof pogo-pin connector (10h)
        i. Priority: Medium
        ii. Completion date: 5.24
    e. Solder the 2nd prototype (6h)
        i. Priority: Medium
        ii. Completion date: 5.28
    f. Potting the 2nd prototype (6h)
        i. Priority: Medium
        ii. Completion date: 5.30
2. Software Design
    a. Coding for new E-paper display module (5h) (Xuanyi Yu)
        i. Priority: Medium
        ii. Completion date: 5.17
    b. Coding for SD card reader (6h) (Xuanyi Yu)
        i. Priority: Medium
        ii. Completion date: 5.17
    c. Coding for Wireless transmission (Zigbee/Bluetooth) (3h) (Xuanyi Yu)
        i. Priority: Medium
        ii. Completion date: 5.24
    d. Coding for GUI for downloading data (20h) (Samuel Givens)
        i. Priority: Medium
        ii. Completion date: 5.24
3. Testing
    a. Test PCB breakout for depth sensor (3h) (Liren Chen)
        i. Priority: Medium
        ii. Completion date: 5.24
    b. Test waterproof pogo-pin connector (3h) (Liren Chen)
        i. Priority: Medium
        ii. Completion date: 5.24
    c. Test wireless data transmission (3h) (Xuanyi Yu)
        i. Priority: Medium
        ii. Completion date: 5.20
    d. Test functionality of GUI (6h) (Samuel Givens)
        i. Priority: Medium
        ii. Completion date: 5.28