Final Report

OCN 418

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My project for this semester was to develop a shallow water drifter capable of recording position via the Global Positioning System and relaying its position telemetrically for real-time data availability and to aid in retrieval. The initial microprocessor used was the Raspberry Pi 3. A script was written to receive GPS signal and relay it through XBee cellular modules. Although XBee communication was successful, several attempts to receive GPS position failed as no satellites were acquired. A replacement GPS receiver, Adafruit Ultimate GPS Breakout Board, was provided but has yet to be tested. An alternate to the Raspberry Pi3 is an Arduino processor with Adafruit Logger and GPS module, although no coding for the Arduino has been written as of yet.

Two housings were under consideration. A more traditional PVC style and one using a coconut shell. The PVC measures approximately 21cm by 10cm and has an internal diameter of 6.5cm. The coconut shells, although slightly variable from coconut to coconut, measure approximately 14cm by 11cm with an internal diameter of 9.5cm. The coconut was cut in half and the meat was removed. Ballast weight was installed and the coconut was resealed with M3 marine sealant. The coconut was placed in a salt-water bath and left for one week. The coconut had clearly lowered in the water column by about 1 to 2cm during that time indicating that it had taken on water. After cutting in half at the sealant line, this was determined to be the case. Ultimately, I decided that the coconuts will not be a viable housing as they i) are porous and require greater efforts of water proofing, ii) will degrade overtime, iii) required application of sealant limiting accessibility and reusability, and iv) are variable in size requiring custom chassis installation for each coconut.

Tasks remaining to be completed include i) test new GPS unit, ii) completion of script, iii) development of installation battery pack, chassis, and final housing. After which, initial trials can take place. I anticipate further requirements including receiving user interface for position signal. If successful, future iterations may include temperature and salinity measurements.

During this semester I was introduced to python coding and had the ability to explore my own ideas for a functioning sensor. Although I need more python practice, the overall experience was good. The drifters can be a valuable tool to use for continued research in the He’eia Fishpond as well as other shallow water environments including lakes, streams, estuaries, and near shore areas.