Wave Height Pressure Sensor

Abstract

By studying wave statistics, marine ecologists and oceanographers can better understand marine ecosystems and the way they respond to climate change. The Wave Height Pressure Sensor measures pressure data in a leak proof and robust casing. The design withstands a bio extensive environment, provides ease of use, and is designed for low cost, high volume, and quality fabrication.

Project Objective

The Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) is currently studying near shore ecosystems along the California coast and in Moorea, Tahiti, as shown in Figure 1 and 2. Their current commercial wave measuring devices are expensive and overly complex. For this reason, there is a need for a low cost programmable pressure instrument for determining wave height only. It will be anchored to the ocean floor for periods of three to six months and will burst sample pressure at 1 to 4 Hz every hour.

Engineering Challenges

Electronics and Programming
- Program a PIC microcontroller using C
- Design and fabricate a Circuit board
- Utilize FAT file allocation on SD Card
- Achieve required resolution by means of an external analog to digital converter
- Calibrate pressure transducer
- Minimize power consumption
- Develop a user interface using LabView

Acknowledgments

Professor Laguette, Professor Libe Washburn, Mr. Cyril Johnson and the Interdisciplinary Oceanography Group at UC Santa Barbara.

Results

Design efforts resulted in:
- Pressure calibrated data (Figure 6 and 7)
- 2 GB of functional memory storage
- Estimated battery life of up to 1 year
- Functional operating depth of 6 ft.
- Estimated cost savings of $11,750/unit (Figure 9)

Casing Design
- Minimize bio fouling through material selection
- Design casing to meet depth/pressure requirements

Recommendations

Resolution and operating depth should be increased by modifying the ADC gain and modifying the pressure transducer. An anchoring device must be designed prior to field use. Finally, the Wave Height Pressure Sensor is to be tested against the benchmark Seabird 26+ device for a three month deployment time to test for accuracy.

References