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| **Class:** | EE498 Senior Design II | | | **Semester:** | Spring 2018 |
|  | | | | | |
| **Group members:** |  | **Project topic:** | *Fiber Optic Sensor for CubeSat* | | |
| *Jiayi Ren*  *Aaron Volpone* |  | | | |
| **Document:** | Progress report | | |

**Current state of the project**

The project has reached calibration stages with the breadboard model of the microprocessor and sensors. Currently work is being done on making more accurate voltage readings from the photodiode sensors. Since prototyping is done on the breadboard now, it is important to account for interference caused by the surrounding peripherals and power source. PCB design is in progress for photodiode and amplifier.

Once the circuit operates as anticipated from one photodiode and the microprocessor, we will move to testing these in an array. The calibration is being done in the lab at the moment. When the program and sensor equipment operate properly, we will begin the minimization process. This includes designing the PCB for both the laser diode and the photodiode sensors.

**Current state and roadmap of the project**

|  |  |  |  |
| --- | --- | --- | --- |
| **Completed steps** | **Step completed** | **Date completed** | **Comment** |
| **AVR Program** | 02/07/2018 | Reads voltage values from the photodiodes and displays them in a command terminal through serial communication. |
| **MC Breadboard operation** | 02/14/2018 | ATMega328P, 8MHz crystal oscillator |
| **Laser operation** | 02/16/2018 | Driven by a constant 0.9V, 65mA power source. Currently using laser driver but will migrate to custom PCB later |
| **Photodiode operation** | 02/16/2018 | Photodiode outputs maximum 2mV at full intensity |
| **Incomplete steps / planned goals** | **Step/goal** | **Date to be completed** | **Comment** |
| **Breadboard demonstration** | 02/21/2018 | Microprocessor, photodiode, and amplifier operate as desired |
| **PCB routing** | 02/21/2018 |  |
| **PCB printing** | 02/21/2018 |  |
| **PCB testing** | 03/17/2018 | After PCB arrival |
| **Mirror mounting** | 04/05/2018 | Mirror needs to be selected and mounted for testing |

**Current problems**

|  |  |  |  |
| --- | --- | --- | --- |
| **Problem** | **Severity** | **Idea(s) how to solve** | **Comment** |
| **Noisy ADC readings** | Moderate | ADC noise reduction power mode, add a decoupling capacitor from AREF to GND. Reduce sampling speed for better accuracy. | If ADC noise is not removed through filtering or software subtraction, the readings we will be getting from the photodiodes will be untrustworthy for angular calculations. |
| **Laser Driver** | Moderate | Design custom driver for the laser to mount on the CubeSat |  |

**Members’ tasks**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Contribution of the member to each task 🡻** | | |  |
| **Member name 1** | **Member name 2** | **Member name 3** | **Task/step completed? (yes/no)** |
| **Task/step 🡻** |
| **Microprocessor programming** | Aaron Volpone |  |  | Yes, on-going improvements |
| **PCB design and routing** | Jiayi Ren |  |  | In process |
| **Reflective mirror** | Aaron Volpone | Jiayi Ren |  | No |

**Comments**

Most equipment is located in TBE-B313. This includes the laser driver and photodiode equipment. This is to properly test the breadboard circuit and calibrate before moving the laser to a working PCB driver.