

EE CprE SE 491 – MAY15-28

MicroCART Senior Design Team

Weekly Report 11

November 10 – 16

Faculty Advisers

Phillip Jones

Nicola Elia

Member	Position	Weekly Hours	Total Hours
Paul Gerver	Key Concept	6	86
Tyler Kurtz	Key Concept	15.25	123
Ravi Nagaraju	Webmaster	4	62
Adam Campbell	Webmaster	6.5	64.5
Joe Benedict	Communications	11.5	120.5
Jacob Rigdon	Communications	5.5	68.5
Matt Vitale	Team Lead	8	99

This Week's Progress

- 1) Accelerometer and Gyroscope data fixed
- 2) Tutorial Documentation started
- 3) Moving PID from RC to bluetooth

Pending Issues

- 1) Updated magnetometer data cannot be read off the main I2C bus for the sensor board and requires additional configuration for the Zybo board to read updated data consistently. Paul is looking into the configuration needed
- 2) Other class commitments made progress for me very difficult - Jacob

Plan of Action

- 1) Order finalized regulator PCBs
- 2) Wi-Fi Communication
- 3) Visit Documentation throughout team
- 4) Fix Magnetometer Data
- 5) Characterize Quadcopter
- 6) Raspberry Pi Camera Implementation

## Contributions

Paul – 6 Hours, 86 Total

- Xilinx Platform Studio and XSDK startup guide - 2
- Worked with Joe to get sensor board biases straightened out and incorporated into a complementary filter - 3
- Attempted to get magnetometer data configuration setup - 1

Tyler – 1.5 Hours, 123 Total

- Attended the meeting - 1.5
- Didn't get any work done as I was out of town

Ravi – 4 Hours, 62 Total

- Meeting w/Client - 1.5
- Worked on website - 0.5
- Finished routing both PCBs and generated Gerber files- 2

Adam – 6.5 Hours, 64.5 Total

- Meeting with client - 1.5
- Got the base station computer to speak bluetooth using the dongle - 2
- Working on migrating the PID to bluetooth - 3

Joe – 11.5 Hours, 120.5 Total

- Team Meeting - 1.5
- Worked with Paul on filtering/optimizing accelerometer and gyroscope data - 3
- Researched Complementary and Kalman filters - 2
- Researched 2-cell batteries for powering Zybo board - 1
- Attempted to fix antennae on RF receiver - 2
- Finished building the mounting adapter for FAQs platform- 2

Matt – 4 Hours, 99 Total

- Starting drafting plans for interrogating the Raspberry Pi camera
  - Will get Jacob caught up if he is at Monday's work-time or after Tuesday's meeting

Jacob – 5.5 Hours, 68.5 Total

- Team meeting – 1.5
- Project Report – 2
- Work on UART communications (488) – 2

Meeting Minutes

- 1) Bluetooth
  - Able to control all four motors by sending PWM signal from PC to the Zybo board
  - Transmission speed = 15 kHz
  - Next Step:
    - a) Set up Bluetooth on base-station PC
- 2) Wi-Fi communication will begin this week
  - Remember to whitelist any devices needing access to the lab router
- 3) MicroCART Project Plan v2.0 document
  - Almost complete (due Wednesday, November 12)
  - Table of Contents added to this version
- 4) PID controls
  - Testing tuning and mixing coefficients after PID software was changed to run motors in the "X" configuration
  - Advised to set mixing coefficients before the PID coefficients
  - 3-axis testing platform (FAQs) will be available after this week
- 5) Chassis and hardware
  - Source RF receiver (client wants one installed for manual piloting)
  - Source  $\geq 1600$  mAh 2-cell batteries for Zybo board
  - Begin mounting strategy for batteries, receivers and power (battery) control boards
- 6) 3-axis sensor
  - Latency tests determined that the all-burst method is preferred over the FIFO method for capturing data
  - All-burst data capture is at  $600 \mu\text{s}$  (anything faster than  $1000 \mu\text{s}$  is good)
  - Able to calculate angles from accelerometer and gyroscope sensors (individually)
  - Next steps:
    - a) Correct gyroscope drift
    - b) Implement a Complementary filter to stabilize and optimize accelerometer and gyroscope data
- 7) Modeling
  - Determine characterization values to begin modeling
- 8) Power (battery) control boards (motors and Zybo)
  - Ready for production by next week
  - Check with Lee Harker for the cost of using the etch machine in The Machine Shop
- 9) Matt assisted OmniCooR team with migrating their system from Debian to Ubuntu
- 10) Client wants an integrated PMUX to serve as remote kill-switch