EE CprE SE 491 – MAY15-28

MicroCART Senior Design Team

Weekly Report 9

October 27 – November 2

Faculty Advisers
Phillip Jones
Nicola Elia

Member	Position	Weekly Hours	Total Hours
Paul Gerver	Key Concept	10	73
Tyler Kurtz	Key Concept	15	106.25
Ravi Nagaraju	Webmaster	6	53
Adam Campbell	Webmaster	5	54
Joe Benedict	Communications	14.5	95
Jacob Rigdon	Communications	5	48
Matt Vitale	Team Lead	8	87

This Week's Progress

1) Regulator circuit designs have been finalized
2) UART Communication working
3) Demonstrated the working model for undeclared engineering students
4) IR Tracker has been mounted
5) MATLAB plotting finished

Pending Issues

1) There is little to no documentation for timing a standalone program on the Zybo board. Luckily, a solution was found by pooling resources and identifying a couple of function calls that use the global timer on the board to the time since the program started.
2) We need more sophisticated battery connections for the old demo quad

Plan of Action

1) Characterize Quadcopter
2) Order regulator circuit
3) Wi-Fi Communication

Contributions

Paul – 10 Hours, 73 Total

- DesignDoc - 6
- Install Xilinx tools for OmniCoor Team - 1
- Finished automated plotting after running MicroCART Program - 1.5
- Investigated Xilinx tools to get timing information to benchmark and find latencies reading the sensor board from the Zybo board - 1.5

Tyler – 15 Hours, 106.25 Total

- Meetings - 2
- PID controls design - 8
- Rebuilding my project - 5

Ravi – 6 Hours, 53 Total

- Meeting w/Client - 1.5
- Worked on and finished schematic on EAGLE with finalized components for both the Zybo board and motor battery regulators - 3
- Met with Ian/Paul to review schematic and discuss next steps - 1
- Updated website - 0.5

Adam – 5 Hours, 54 Total

- Meeting with client - 2
- Worked with Matt to remake one of the bluetooth projects - 1
- Worked with Tyler on PID tuning - 2

Joe – 14.5 Hours, 95 Total

- Meeting with client - 2
- Mounted IR tracker platform - 1
- Lowered overall stack of sensor, Zybo, IR tracker - 2
- Created and uploaded design drawings for team design document - 2.5
- Demonstrated quadcopter for Undeclared Learning Community - 2
- Organized and cleaned up lab - 1
- Studied complementary filters - 4

Matt – 8 Hours, 87 Total

- Demoing / setting up for demoing – 8

Jacob – 5 Hours, 48 Total

- Team meeting – 2
- Project Report – 2

- Work on UART communications – 4
- Demonstration for prospective engineering students - 1

Meeting Minutes

1) Client requested explanation for delayed progress on specific tasks
   - Battery regulators (motors and Zybo)
     a) Creating PCB layouts more challenging than anticipated
     b) Switched to a different software for layout design
     c) Difficulty finding proper package for step-down regulator that's easily solderable
   - Bluetooth UART communications
     a) Busy schedules delayed progress on this task
   - In order to expedite solutions, the client advised the entire team that he is to be notified immediately when a task timeline is delayed for a prolonged period
2) Repository
   - Client would like a directory added just for videos
     a) Videos should be 1-2 minute clips of processes, tasks and demonstrations
3) MicroCART Project Design document
   - Due tonight - 10/28/14
     a) Only a few more items need to be added for completion
4) PID controls
   - Able to read IR tracker data from the camera system and send it via RF transmitter to the Zybo board
5) Chassis and hardware
   - Zybo cover and IR tracker are mounted
   - Adapters for single axis and 3-axis test platforms are finished
   - 3-axis testing platform is in production and should be delivered next week
   - Next steps:
     a) Lower sensor/Zybo/IR tracker stack below the plane of the motor cap nuts
     b) Source a RF receiver
     c) Source more 2-cell batteries
     d) Mount batteries and RF receiver
6) 3-axis sensor
   - Discussed using FIFO or burst read to retrieve data
     a) Decided to use FIFO because it will provide a snapshot of all the sensors (accelerometer, gyroscope and magnetometer) at a given time

    b) Burst method will give different time-frames for each sensor
- Timing constraints of the sensor board
    a) Accelerometers update at 1 kHz and the gyroscopes update at 8 kHz
    b) The sensor is using a 400 kHz "clock" (baud rate on the I2C bus)
- Next steps:
    a) Read data from magnetometer and gyroscope
    b) Determine the exact timing and latency for reading a register
    c) Interpret output data and relate to real-world values

7) Modeling
    - Learning about complementary filters
8) Battery regulators (motors and Zybo)
    - Need to find a step-down regulator package that's easily solderable
    - Designs are in final stages and should be ready for production by next week
9) GUI development
    - Create a preprogrammed demo mode