EE CprE SE 491 – MAY15-28

MicroCART Senior Design Team

Weekly Report 7

October 13 – 19

Faculty Advisers
Phillip Jones
Nicola Elia

Member	Position	Weekly Hours	Total Hours
Paul Gerver	Key Concept	10	53
Tyler Kurtz	Key Concept	14.25	83.25
Ravi Nagaraju	Webmaster	4	42.5
Adam Campbell	Webmaster	5	42
Joe Benedict	Communications	11	68.5
Jacob Rigdon	Communications	4	43
Matt Vitale	Team Lead	14	71

This Week's Progress

1) Sketch made of the voltage regulator circuit
2) Implemented Mixer
3) I^2C Connection made with Sensor Board
4) Restructuring of Git repository
5) Mounted Zybo Board to chassis
6) Received two new Zybo Boards for increased testing and debugging opportunities

Pending Issues

1) Interview preparations and accommodations impeded accomplished work on Bluetooth - Jacob

Plan of Action

1) Finalize voltage regulator circuit and PCB layout - Ravi
2) Send sensor output off-board via Bluetooth – Jacob/Adam
3) Characterize Quadcopter
4) Group-wide understanding of PID

Contributions

Paul – 10 Hours, 53 Total
- Worked on MATLAB code to be more elaborate and actually grab recent flight data - 1
- Worked on I2C debugging (reading datasheets, Oscoping pins, looked into reseting I2C controller, configuring system control registers through software) - 9

Tyler – 14.25 Hours, 83.25 Total
- Implemented and tested mixer/Rx receiver system
- Improved mixer design (Throttle/roll/pitch/yaw are all weighted by coefficients at the top in a definitions list)
- Mapped wire connections for Rx system and mapped motor positions/number
- Recorded throttle, roll, yaw, pitch min/max/ranges
- Recorded motor minimum
- Created kill switch from RF Tx
- Fixer motor spin direction
- Meeting with client - 2

Ravi – 4 Hours, 42.5 Total
- Meeting w/Client - 1.5
- Worked on website (added links to datasheets, wiki) - 0.5
- Worked on hand sketch of updated regulator circuit - 2
- Worked with Joe to create list of quad parameters for characterization - 1.5

Adam – 5 Hours, 42 Total
- Meeting with client - 2
- Refactored repo structure, now we have 1 workspace per 1 hardware configuration, and 1 project per task - 2
- Tried to get UART working to communicate with the bluetooth module - 1

Joe – 11 Hours, 68.5 Total
- Meeting with client - 2
- Research on PID controllers - 1
- Meetings with Lee Harker (including Machine Shop safety training- 1.25
- Mounting Zybo board to chassis (including slight modifications) - 2
- Group work session - 3
  - Zybo board mounting work
  - Spacers in the 3-axis sensor board holes to prevent any play between the board and the mounting screws
  - Discussed AutoCAD training with Matt (time TBD)
  - Discussed quad characterization strategy with Ravi

- Read excerpts from Matt Rich's thesis for characterizing the quad - 1
- Met with Matt Rich to learn how to run the moment of inertia encoder - 0.75

Matt – 14 Hours, 71 Total
- I2C connection to sensor board [finally established!] - 8
- meetings and such - 6

Jacob – 8 Hours, 47 Total
- Team meeting – 2
- Project Report – 2

Meeting Minutes

1) Bluetooth and Wi-Fi communications
   - Able to pair Bluetooth with laptop and configure Bluetooth module from a "factory reset" state using Putty on the laptop
   - Currently unable to send communications from the Zybo back to the laptop
     a) Issue may be related to the SDK workspace sharing all the tasks
   - Next steps:
     a) Restructuring the SDK
   - Work on 2-way communication after project is rebuilt
2) Motors
   - Motors run fine on 450 Hz frequency
   - Confirmed there's no performance difference (RPM measurements) between 450 Hz and 50 Hz signals
   - PWM decoder is working
   - Next steps:
     a) Establish a 5.0 V supply to run the receiver (Zybo may supply 3.7 V only)
     b) Bind receiver to transmitter
     c) Begin writing the mixing code

3) Zybo board
   - Mounted on the Flame Wheel chassis (easily adjustable and replaceable)
   - Next step:
     a) Find a way to tap 5.0 V from the board for the receiver power
4) 3-axis sensor
   - Appears the clock is too fast and still trying to identify the cause
   - Disabling the interrupts was suggested

- Dr. Jones suggested more team members assist with this important task due to the complicated nature of the issue
5) Data logging
   - Develop file format that allows proper file retrieval for plotting
   - Next steps:
     a) Run tests with demo quadcopter to verify flight data is captured and plotted properly (automatically?) after test ends
6) Battery regulators
   - KiCad PCB design tool is not user friendly
   - Will use Eagle design tool instead (compatible with Gerber file type)
   - Dr. Jones advised Gerber file type is best for PCB designs (universally recognized)
   - Functions needed on the Zybo battery regulator
     a) Step-down voltage from battery input to steady 5.0 V
     b) Output signal for monitoring the battery voltage level (sent to Zybo)
     c) LED to indicate low battery
     d) LED to indicate reverse polarity of battery connection
     e) Cut-off battery protector to prevent over-discharging
   - Functions needed on the motors battery regulator
     a) Output signal for monitoring the battery voltage level (sent to Zybo)
     b) LED to indicate low battery
     c) LED to indicate reverse polarity of battery connection
     d) Cut-off battery protector to prevent over-discharging