

EE CprE SE 492 – MAY15-28

MicroCART Senior Design Team

Weekly Report 28

April 20 – 26

Faculty Advisers

Phillip Jones

Nicola Elia

Member	Position	Weekly Hours	Total Hours
Paul Gerver	Key Concept	14	245
Tyler Kurtz	Key Concept	15	205.5
Ravi Nagaraju	Webmaster	6	135
Adam Campbell	Webmaster	6	136.5
Joe Benedict	Communications	17	266.75
Jacob Rigdon	Communications	6	136
Matt Vitale	Team Lead	2	161.75
Matt Post	Key Concept	9	77.5

### Progress

- 1) Polish of Final Document
- 2) New, updated website has been created, YouTube Channel will be populated
- 3) Improved manual flight by tweaking PID coefficients
- 4) Added yaw input from camera system to stabilize manual flight
- 5) Hardware based kill switch implemented and tested successfully

### Plan of Action

- 1) Submit 492 Final Document
- 2) Industry Panel and Demonstrations take place this week
- 3) Finish and publish website – Publicize YouTube Channel
- 4) More documentation

### Pending Issues

- 1) Zybo battery regulator v2.0 did not function as expected. Initial testing showed that the output voltage was not within range for the expected input voltage. Low battery indicator did not function either. The cause has not yet been determined.
- 2) Might not be able to get any better manual flight performance unless a better algorithm is used. Perhaps a Kalman filter.

## Contributions

Paul – 14 Hours, 245 Total

- Added gimbal equations for gyro smoothing - 1
  - Added transformation to code
  - Collected data to check for anomalies
- Worked with Tyler, Joe, and Matt P to tweak PID coefficients for better manual flight - 3
  - Worked on minimizing swaying of quadcopter in the roll direction
  - Ended up tightening the D coefficient
- Worked on Final Report - 10
  - Revised old design doc and project plan
  - Added missing information sections like an in-depth PID controller explanation
  - Added Appendices for Code, Operation Manual, Lessons Learned, and Previous design decisions

Tyler – 15 Hours, 205.5 Total

- Helped review manual flight progress - 3
- Implemented synthesizable arctan and sqrt components in VHDL - 6
- Implemented i2c reader - 3
- Implemented PD controller in VHDL - 3

Ravi – 6 Hours, 135 Total

- Meeting w/client - 1.5
- Wrote testing procedures for power boards - 1.5
- Cleaned up and organized website - 1.5
- Met with Joe to test PCBs - 1.5

Matt V. – 2 Hours, 161.75 Total

- Looked at YouTube videos to see which are suitable while leaving suggested trimming points – 2

Adam – 6 Hours, 136.5 Total

- Meeting with client - 1.5
- Incorporated camera yaw into the outer PID loop - 2.5
- Documentation for the base station programs used to run the manual flight - 2

Matt P. – 9 Hours, 77.5 Total

- PID Tuning. See Paul's notes - 3
- Drilled and balanced new props - 2
- Made demo video for drilling out props for future team - 1
- Began working on design doc focusing on issues during tuning - 2
- Client Meeting - 1

Joe – 17 Hours, 266.75 Total

- Client Meeting with manual flight demonstration – 2
- Flight testing and tuning with Matt P, Paul and Adam – 8
  - Day 1 – adjusted constants and added booties
  - Day 2 – added yaw value from camera
  - Day 3 – added gimbal matrix and further tuned PIDs
- Built two and tested one Zybo battery regulator v2.0 – 5
- Soldered connectors on new batteries – 1
- Minor cosmetic improvements on quad - 1

Jacob – 6 Hours, 136 Total

- Team Meeting - 1
- Team Documentation – 1
- Website and YouTube Work - 4
  - Met with Joe and Matt V about website design decisions and feedback
  - Edited videos

Meeting Minutes

- 1) Project poster
  - Only one item needed to be changed. Increase margin in the text boxes
- 2) Reduce damage during flight crashed
  - Shut down motors during impending crash to slow/stop the props
  - Add padded feet to reduce the shock during hard landings
- 3) Camera data
  - Able to send yaw values via Bluetooth from base station to quad
  - Next steps:
    - Implement camera's yaw value in the on-board mixer
    - Test on 3-axis stand
    - Test during manual flight
- 4) PID tuning
  - Ready to add yaw value from camera system
  - Ready to add gimbal matrix
- 5) Zybo battery regulator
  - Waiting for PCB boards to be delivered
- 6) Website needs final touches
  - Joe, Matt V and Jacob will meet to discuss changes

7) GUI

- Will use the streamlined version from last year's team
- Need to integrate X,Y and Z positional data from the camera system to implement automatic flight

8) Need to create documentation for reaming props to fit motor shaft

9) YouTube video channel

- The drive has a play list folder
- Videos need descriptions