

EE CprE 491 – Fall 2019

MicroCART Senior Design Team

Weekly Report 8

Nov 11th - Nov 18th

Faculty Advisors: Phillip Jones, Matt Cauwels, James Talbert

Team Members:

Evan Blough -- Technical Team Lead, Embedded Software Lead
Kynara Fernandes -- Ground Control Station Lead
Aaron Szeto -- Controls Lead
Joe Gamble -- Embedded Hardware Lead
Shubham Sharma -- Crazy Fly Implementation Lead, Website Manager
Jacob Brown -- Physical Hardware Lead

Summary for Progress this Week

This week we got the second drone to fly manually. We also made some progress on the ground control station GUI.

Past Week Accomplishments

- Worked with James to troubleshoot drone issues. Got drone to fly manually -Evan, Joe
- Made documentation on software project re import workspace procedure in XSDK. -Evan
- Worked on implementing multiple slider bars in modular fashion - Kynara, Evan
- Continued testing old log files -Aaron
- Design document review with 491 faculty. - Evan, Joe, Aaron

Pending Issues

- Integrating slider bars with existing GCS GUI
- Matlab Vercat error with data log file “2018-04-24”

Individual Contributions

Team Member	Contribution	Week 3 Hours	Total Hours
Evan Blough	Worked with James on troubleshooting drone flight. Made documentation for re-importing software project on master. Made a slider bar layout object with Kynara.	7	78
Kynara Fernandes	Redesigned the new tab to take into account future change of controller.	7	66.5

Joe Gamble	Worked with James on troubleshooting drone flight.	3	61
Jacob Brown	Soldered/fixed crazy flies	5	45
Aaron Szeto	Continued testing old log files. Found broken log file and tried fixing it	4	52
Shubham Sharma	Crazyflie VM connects and works with the VM	5	54

Plans for Coming Week

- Run embedded software in debug mode to check all flight tests and communication with GCS. If all flight tests pass, will start to look into autonomous flight functionality with heavy safety precautions.
- Start adding Doxygen Documentation for C and C++ in git repo.
- Adding a drawing pad to the GCS that generates a script for the drone to run
- Keep making progress with CF

Appendix:

- Error message from log file “2018-04-2

```
>> DataAnalysis
# MicroCART On-board Quad Log
# Sample size: 45534
# IMU IIC failures: 0
# LiDAR IIC failures: 0
# Optical Flow IIC failures: 0
# Roll PID : Kp = 35.000000 Ki = 0.000000 Kd = 1.000000 Alpha = 0.880000
# Pitch PID : Kp = 35.000000 Ki = 0.000000 Kd = 1.000000 Alpha = 0.880000
# Yaw PID : Kp = 2.600000 Ki = 0.000000 Kd = 0.000000 Alpha = 0.000000
# Roll Rate PID : Kp = 0.030000 Ki = 0.000000 Kd = 0.005000 Alpha = 0.880000
# Pitch Rate PID : Kp = 0.030000 Ki = 0.000000 Kd = 0.005000 Alpha = 0.880000
# Yaw Rate PID : Kp = 0.297000 Ki = 0.000000 Kd = 0.000000 Alpha = 0.000000
# X pos PID : Kp = 0.550000 Ki = 0.007500 Kd = 0.000000 Alpha = 0.000000
# Y pos PID : Kp = 0.550000 Ki = 0.007500 Kd = 0.000000 Alpha = 0.000000
# Altitude PID : Kp = -0.098040 Ki = -0.008170 Kd = -0.073530 Alpha = 0.880000
# X Vel PID : Kp = -0.100000 Ki = 0.000000 Kd = -0.020000 Alpha = 0.000000
# Y Vel PID : Kp = 0.100000 Ki = 0.000000 Kd = 0.020000 Alpha = 0.000000
# X Vel : Kp = 0.000000 Ki = 0.000000 Kd = -1.000000 Alpha = 0.880000
# Y Vel : Kp = 0.000000 Ki = 0.000000 Kd = -1.000000 Alpha = 0.880000
Error using vertcat
Dimensions of arrays being concatenated are not consistent.

Error in parse_log (line 99)
log = [log;line];

Error in DataAnalysis (line 100)
expData = parse_log(params.filePathName, params);
```

- Documentation for re importing project if project files are corrupted

documentation/quad/software/how_to_reimport_xsdk_project.md · documentation · Distributed Autonomous Networked Control Lab / MicroCART · GitLab - Mozilla Firefox

Visualizing Git

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https://git.ece.iastate.edu/danc/MicroCART/blob/documentation/documentation/quad/software/how_to_reimport_xsdk

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how_to_reimport_xsdk_project.md 3.26 KB

Re-Importing the /quad Software Project into XSDK

Git version control and XSDK have some compatibility issues. Sometimes, throughout the course of development for the FPGA, the project files may become corrupted in the git Repo. If the project is throwing abnormal errors citing header files are not found, or functions aren't instantiated, You can take the source within the project and re-generate an application project in XSDK. This may fix these compilation errors. This document may need to be updated as development on MicroCART continues. This guide assumes you are running the 2018.3 version of Vivado.

TOC

- Open XSDK in the XSDK WORKSPACE
- Make sure the application is open in C/C++ application perspective
- Open a new application project
- Add the source folder to the project
- Exclude unused folders from project compilation
- Modify Project Properties
- Copy over hw and load scripts from source

Open XSDK

Open XSDK by typing xsdk & into the terminal. It should let you select a workspace. Select the xsdk_workspace in the Git Repo.

Check C/C++ application perspective

This part is important to make sure the project is generated properly. There should be a small icon in the upper right corner of the screen. If you hold the cursor over this image it will say c/c++ application perspective. [C/C++ApplicationPerspective](#)

Open a New Application Project

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Open XSDK

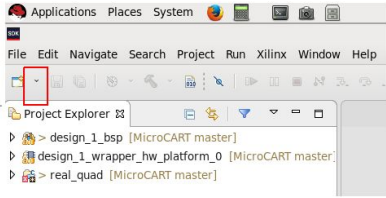
Open XSDK by typing xsdk & into the terminal. It should let you select a workspace. Select the xsdk_workspace in the Git Repo.

Check C/C++ application perspective

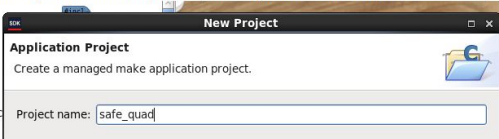
This part is important to make sure the project is generated properly. There should be a small icon in the upper right corner of the screen. If you hold the cursor over this image it will say c/c++ application perspective. [C/C++ApplicationPerspective](#)

Open a New Application Project

Click the dropdown menu in the upper left and select the new application project option.



Make sure you select a hardware platform generated by Vivado to make the bsp file. This file will likely be named design_1_wrapper_hw_platform_0.



Application Project

Create a managed make application project.

Project name:

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Add the Source Folder to the Project

Manually adding the files to the workspace introduce some issues with XSDK. To avoid these you can create a /src folder in the repository and link to these files that are outside the workspace. Right click in the project explorer pane within the project files. Select add a New-folder. The window should look like this.

Folder

Location \local\ucart\MicroCART\quad\src\ may overlap another resource. This can cause unexpected side-effects.

Enter or select the parent folder:

safe_quad

- > design_1_bsp [MicroCART master]
- > design_1_wrapper_hw_platform_0 [MicroCART master]
- > real_quad [MicroCART master]
- > RemoteSystemsTempFiles [MicroCART master]
- > safe_quad [MicroCART master]
- > safe_quad_bsp [MicroCART master]

Folder name: ext

<< Advanced

Use default location

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Click the browse button to choose the /src directory. Make sure to select the link to alternate location. Name the new folder /ext.

Exclude the unused folders

After adding the source, you need to remove some of these files from the source directory that aren't actually used. Right click on the /gen_diagram, /virtquad, and /test folders in the project. There will be a Resource_Configuration-exclude_from_build option. Pick this option.

Modify Project Properties

Right click on the project folder in the project explorer pane to select the properties section. There will be a C/C++ Build section that contains another settings subsection. Click settings. Click the libraries section and add the m library. This is the math library for C. Add all the folders in the /ext folder to the directories section.

Properties for safe_quad

type filter text

Settings

Configuration: Debug [Active] Manage Configurations...

Tool Settings | Devices | Build Steps | Build Artifact | Binary Parsers | Error Parsers

- ARM v7 gcc assembler
 - General
- ARM v7 gcc compiler
 - Symbols
 - Warnings
 - Optimization
 - Debugging
 - Profiling

Include Paths

- "\${workspace_loc}/\${ProjName}/ext/commands"
- "\${workspace_loc}/\${ProjName}/ext/computation_graph"
- "\${workspace_loc}/\${ProjName}/ext/graph_blocks"
- "\${workspace_loc}/\${ProjName}/ext/quad_app"
- "\${workspace_loc}/\${ProjName}/ext/queue"

