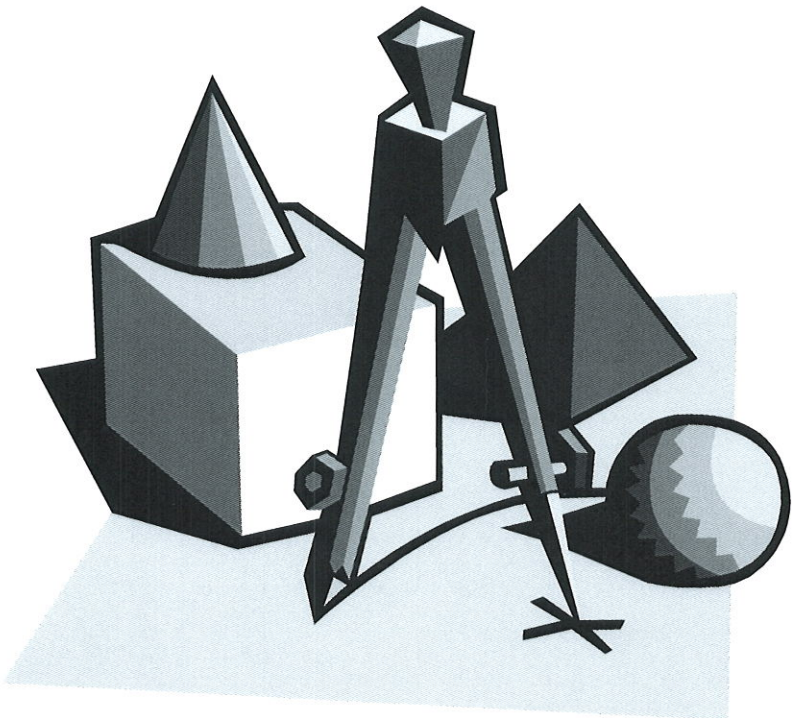
Engineering Design Notebook



Name Sriharsha Singam

Project Title Drone Buddy

Contact Info. harsha singam 3 @ gatech.edu

Teammates:

- Zachary C Mathews: zmathews3@gatech.edu
- Jerrin Kakkanatt: kakkanattj@gatech.edu
- George N Germanakos: ggermanakos3@gatech.edu

Rules for Keeping an Engineering Design Notebook

1. On the front of the notebook enter the project title, your name and other information needed to return the notebook to you in case it is lost.
2. Keep a table of contents at the front of the notebook.
3. All entries must be done in ink.
4. Design notebooks do not have to be neat but they must be legible.
    a. Do not be obsessed with neatness at the expense of faithfully recording everything as it happens.
    b. Do not crowd the materials on the pages.
5. Make your entries at the time you do the work.
    a. Include all results and learned information whether favorable or unfavorable.
    b. Include all information even if you do not fully understand it at the time of entry.
6. If you make errors, just cross them out with an X or a single line.
    a. Do not mark through anything so that it can not be read.
7. Do not erase anything.
8. Never tear a page out of the notebook.
9. All data must be in their original form (calculations, charts, pictures, sketches on scrap paper, etc.), not after recalculation or transformation.
10. Rough drawings should be done directly in the notebook. More careful drawings such as machine drawings or computer-generated plots should be made and entered in the book.
11. Information on loose sheets of paper should be entered into the notebook by:
    a. Taping the loose paper to the next available blank page in the notebook
    b. Taping each corner of the loose paper
    c. Use a tape that will accept ink permanently
    d. Place your signature on the loose paper, continue across the tape and end on the design notebook page. Sign across each corner of the taped pare. Date the signature.
12. Information that can be retrieved easily (such as research articles from journals) should not be entered into the notebook. Enter only the needed information and the location and the location of the information in case you must retrieve it again.
13. Title each page of the notebook and enter the information on the Table of Contents.
14. Sign and date the notebook page at the space provided at the bottom.
15. Have your design entries witnessed and have the witness sign and date at the space provided.
    a. The witness needs to have the technical ability to understand the entry.
    b. The work can be witnessed periodically.
16. Every page of the notebook must be numbered.
17. No pages should be skilled. This is a chronological record of your work.

A good engineering design notebook is one that can be used to reconstruct your work even years after you have completed the original project. Other engineers should be able to use the notebook to reconstruct your work. The notebook will be used to determine the rightful owner of patents and other proprietary ideas.

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Title of Activity Project Ideation

Title of Project Drone Buddy

This was for Assignment #1. I thought I had a good idea during out first "non-team" meeting.

We were shooting ideas back and forth for out first assignment. Someone thought of a "smart-mirror". And then, I thought of Drone Buddy. I thought of all the problems on Campus and I remember having to walk to the CRC from Nave alone in the dark for the Rowing Club. At 2 instances someone walked up to me and asked for money.

↳ This wasn't with criminal intent but I didn't feel safe.

I thought a drone following me at my time in need would have discouraged events like that.

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by Richard Stys Date 1/13/2020

Title of Activity 2nd part to drone buddy

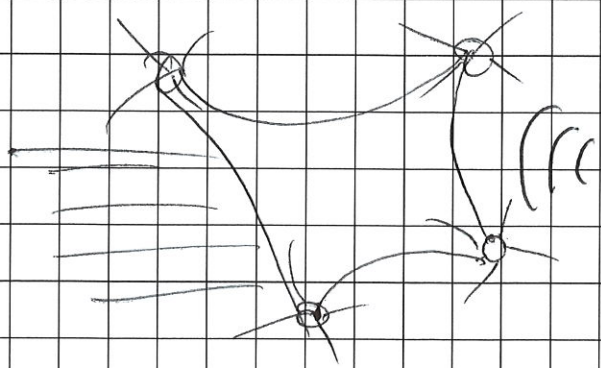
Title of Project Drone Buddy

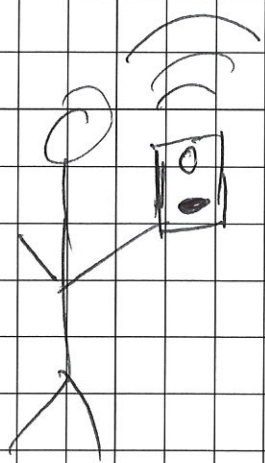
Another project discussion.

Thought of an added feature to Drone Buddy.

↳ Autonomous Danger sensing.

Don't know how feasible this ~~feat~~ feature is.





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Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by Schneider Sjr Date 1/15/2020

Title of Activity Submitting Project Idea

Title of Project Drone Buddy

Submitted Project Idea on Canvas so that we can create a team.

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by Sihan Sigan Date 1/20/2020

Title of Activity First Team Meeting

Title of Project Drone Buddy

Today we saw our new Team Members for the first time.

I knew George from the previous team in Assignment 1. He was a CmPE.

We talked about our specialties and possible features for the drone. Saw what I had in mind at first.

We that the whole "danger Sensing Idea" may not be entirely feasible.

Zach had prior experience with Machine Learning. Everyone was present.

Current Plan:

- Drone Accompanies the user via phone.
- Drone can partially sense danger and call GTPD.

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by Debanshi Sinha Date 2/12/2020

Title of Activity Project Advisor & Technical Review

Title of Project Drone Buddy.

Finally decided on Dr. Hassler as our project Advisor.

That evening, I did research for my technical review paper.

My main concern for the project was the feasibility. So I looked into current autonomous drones on the market. After little research I found ONLY 2 project with Autonomous drones.

Google & Amazon are currently developing Partially autonomous drones.

↳ I then realized that there is some law against un-supervised drones.

Google's project uses Machine Learing! And I think is waiting for Laws to Change, to implement.

This made me realize we would need a seperate CPU to compute ML programs. This would be a requirement.

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by Nathan Hyun Date 2/24/2020

Title of Activity Meeting with Dr. Hassler.

Title of Project Drone Buddy

Jerrin & I finally met with our Project Advisor.

She gave quite a few points to think on.

↳ Potential Bottlenecks / Drawbacks:

- ↳ weight
- ↳ flight time
- ↳ Ability for Camera & Microphone to pick up decent signals
- ↳ Internet access to the drone.

Also new idea. To place Microphone/ Cameras throughout campus, so as to not rely on the drone for Audio/Visual data. Through that idea the ML processing would happen in the CLOUD. The Drone Network will be controlled from the cloud.

Class meeting ⇒ Also as a team we discussed the SKILLS MATRIX Assignment.

We also discussed parts and how to overall go build → thoughts.

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by Jerrin Dijo Date 3/6/2020

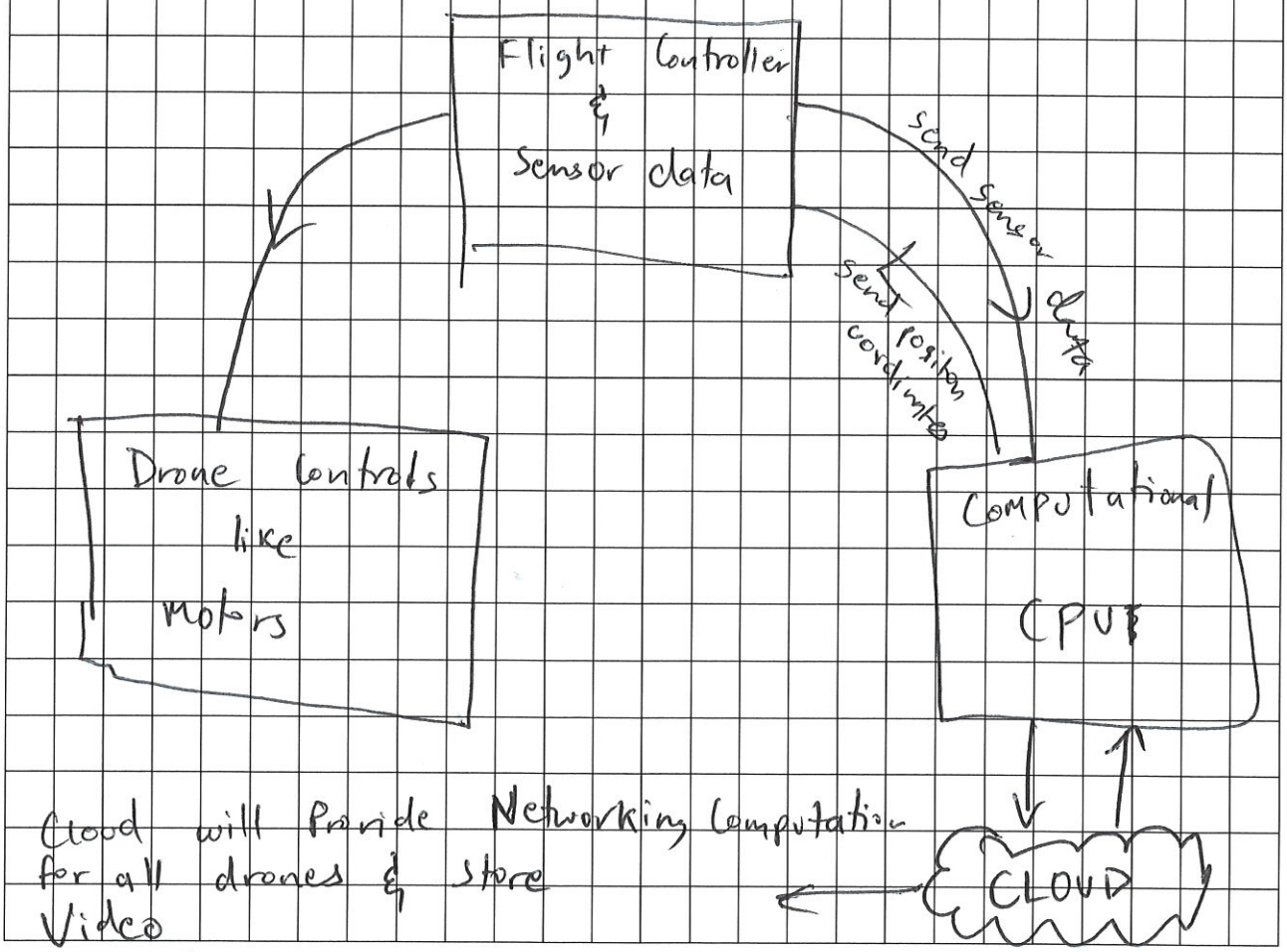
Title of Activity ~~Research~~ Current Thoughts

Title of Project Drone Buddy

We had done a little bit of research.

We would need certain things.

- Drone Chassis
- Flight Controller → Programmable.
- Some Computer?
- Batteries.



Cloud will Provide Networking Computation for all drones & store Video

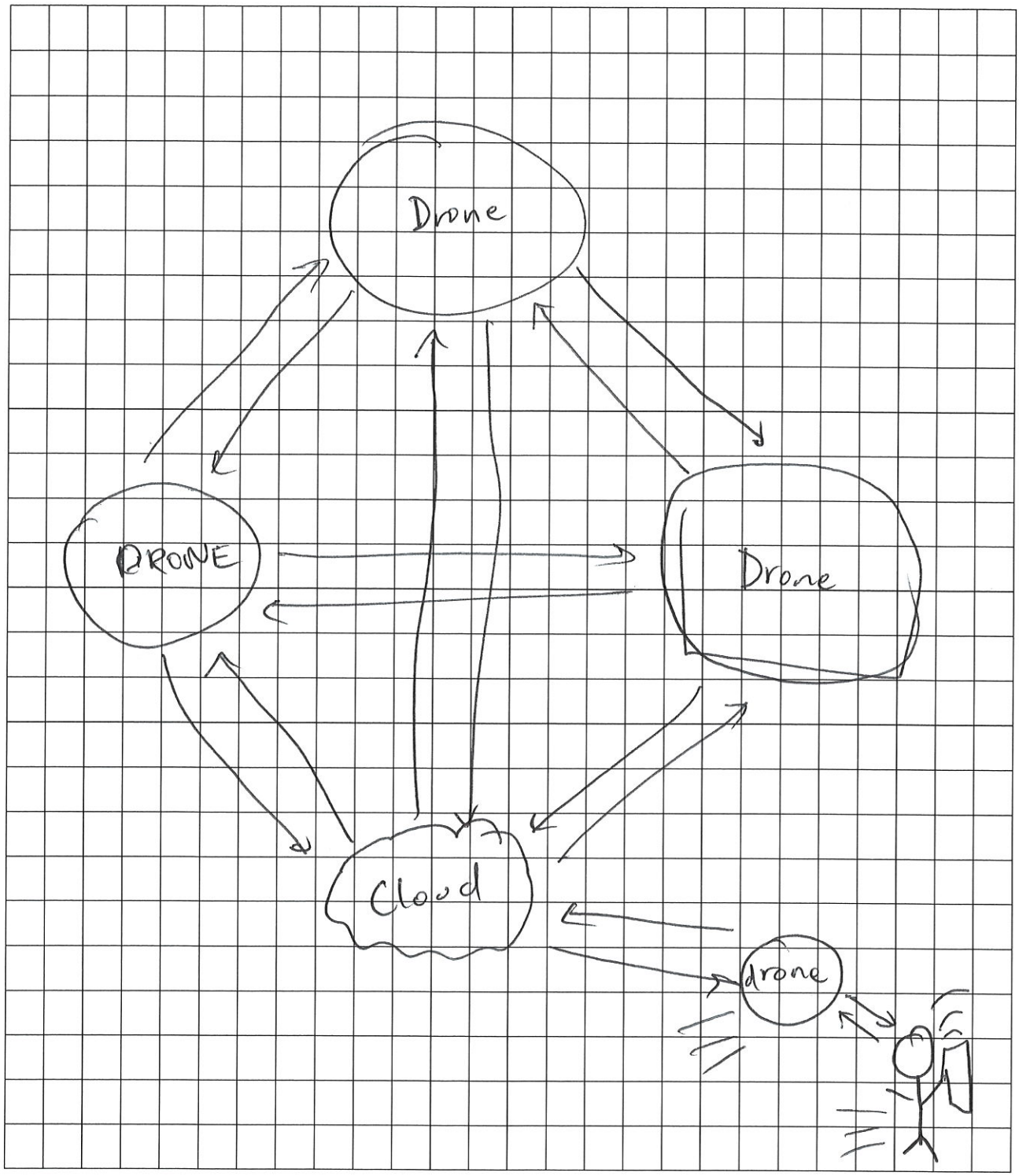
Continued on Page 13

Winessed and Understood by _____ Date 3/18/2020

Recorded by _____ Date 3/18/2020

Title of Activity _____

Title of Project ~~Drone Buddy.~~



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Winessed and Understood by _____ Date 3/18/2020

Recorded by _____ Date 3/18/2020

Title of Activity Assignment #5

Title of Project Drone Buddy

Needed to complete Assignment 5.

↳ Talked able timeline & overall tasked

↳ I built a GANTT Chart based on that.

↳ Also built CPM Chart.

Upon deciding all the upcoming tasks we start to discuss / research for the following tasks:

→ Find Good Flight Controller.
→ " Motion Tracking Algorithims
→ Part Selection

→ For Project Proposal

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by [illegible] Date 11/4/2020

Title of Activity Project Proposal

Title of Project Drone Buddy.

Creating Bill of Materials.

- Looking at Good Flight Controllers.
  - Found TOO cheap one. It probably wouldn't work for our implementation.
  - Ended on DJI N3
    - Includes all necessary sensors.
- Saw that we needed a separate computer
  - Zach found Intel Up Board
    - This would be for the Machine Learning Algos.

→ The rest of the parts came from minimal parts.

→ Also decided on an LTE module to be able to control drone from Cloud.

Continued on Page ____

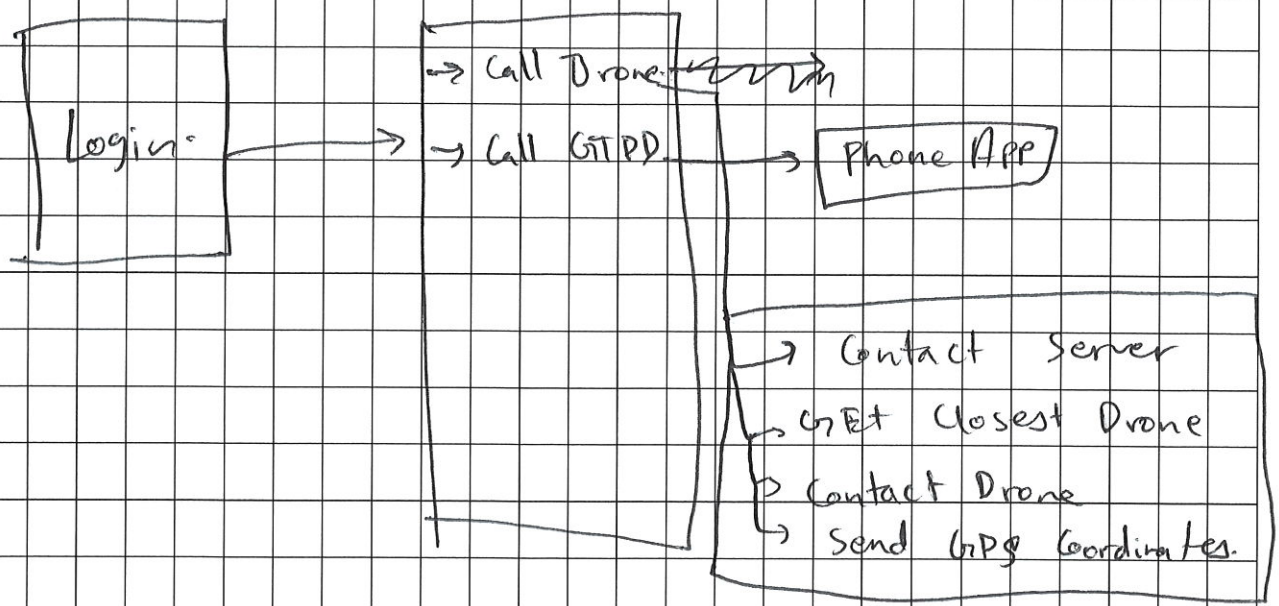
Winessed and Understood by Zachary Matthews Date 4/20/2020

Recorded by Dillon Tyn Date 4/17/2020

Title of Activity Mobile App Dev

Title of Project Drone Buddy.

Started on the Mobile App
↳ Using flutter



Creating Flow diagram for App.
↳ Not Completed → In progress.

Continued on Page ____

Winessed and Understood by [signature] Date 4/19/2020

Recorded by [signature] Date 4/19/2020

Title of Activity Team Meeting → Semester #2

Title of Project Drone Buddy

Everyone Present

Main Talking Points:

→ Next Steps moving Forward
→ Talk about Pg upcoming Proposal Presentation
→ Updating scope for Project Proposal

→ Discussed how we might adjust to ~~Covid~~ Coronavirus.

↳ I am working Remotely (from home)

→ Also due to some restrictions, the scope of the project "MAY" not be feasible.

↳ Especially the ~~autono~~ ability for the drone to "sense" danger.

To DO:

→ Set up next meeting to go into depth of the proposal presentation.

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 10/2/20

Recorded by [signature] Date ~~8/17/20~~ 8/17/20

Title of Activity Team Meeting → Proposal Presentation

Title of Project Drone Buddy.

Every body Present

→ Decide what to add to Presentation

↳ We weren't entirely sure what to put in the slides

↳ All agreed the information we got about what to do was pretty minimal

→ Relooked over our First Draft of Parts to order

↳ Noticed that the DJI flight Controller (made in china) may not be suitable to be used with the police

↳ Also it was very pricey ⇒ $450

↳ Found a cheaper flight ~~Controller~~ Controller

↳ "get fpv.com"

↳ $45

↳ This would allow use to buy multiple Parts.

↳ Lumenier Lux F7

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Winessed and Understood by Zachary Matthews Date 10/2/20

Recorded by [illegible] Date 8/19/20

Title of Activity _____

Title of Project Drone Buddy

↳ Found that the battery was "out of stock"

↳ Looked for a similar priced one on "getfpv.com"

↳ ~~LiPo~~ → LiIon 1000mAh, 14.8V

The change in Flight Controller ~~would~~ will change our plans:

New Flight Controller

↳ ~~So~~ Connections need to be ~~to~~ soldered.

↳ Need to look for an accompanying:

↳ Electronic Speed Control

↳ looked on "getfpv.com"

↳ WEED → Flight Control Software

↳ found ⇒ Beta Flight

↳ Its an Open-Source Git Repo that is compatible with our new flight Controller

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Winessed and Understood by Zachary Matthews Date 10/2/20

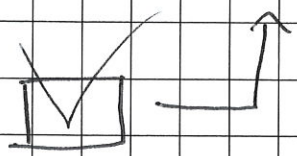
Recorded by [signature] Date 8/19/20

Title of Activity _____

Title of Project _____

To-Do:

↳ Make Proposal Presentation BY Aug 21 Midnight



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Winessed and Understood by Zachary Matthews Date 10/2/20

Recorded by Kristen Lyn Date 8/19/20

Title of Activity Making Proposal Presentation

Title of Project Drone Buddy

→ Created Intro page and then realized we don't have any information to back the idea that college campuses may not be 100% safe

↳ Knew from experience

↳ Found: nces.ed.gov

↳ This showed that there has been an steady increase in "Forcible Sex Offence"

↳ Also found an uptick in Gun Violence on campus

↳ Campus Safety 2017 report.

→ Added rest of slides and placed part images and waited for my teammates to complete the rest.

Zachary Matthews 10/2/20

Continued on Page ____

Winessed and Understood by [signature] Date 8/20/20

Recorded by [signature] Date 8/20/20

Title of Activity ~~Weekly~~ Meeting with Project Advisor

Title of Project Drone Buddy

Everybody present ☑ Finished Proposal Presentation on Aug 21

Topics:

- Changes needed for Proposal Presentation
- What steps might need to be taken in order for use to start building the project.
- [illegible]

Feedback:

- Too many slides for a relatively short presentation
- Not enough technical data
- Needs more understanding on how all the parts will fit together
- Add better graph that shows Campus Violence.

Its seems like to start ordering parts ~~we~~ we need to get an approval for our proposal Presentation.

- ☑ Finish Proposal Presentation & get approval
- ☑ Make Video through Bluejeans for Proposal Presentation.

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 10/2/20

Recorded by Sindhu Iyer Date 8/31/20

Title of Activity More Changes to Presentation

Title of Project Drone Buddy

→ Added better graphs to show that Sexual Assault and Gun Violence are on a steady incline over the last 5 years.

→ Bunched up related parts in particular slider

↳ to reduce ~~over~~ overall size of presentation.

↳ Point out & how these related parts would fit together on the Drone frame.

Later:

↳ Consulted with teammates on changes

↳ Sent new ~~presential~~ presentation to Professor Hassler for approval

Zachary Matthews 10/2/20

Continued on Page ____

Winessed and Understood by _____ Date 9/1/20

Recorded by _____ Date 9/1/20

Title of Activity Presentation Needs Further Changes

Title of Project Drone Buddy.

Feed back

↳ Presentation did not show a story of how it all works together

↳ Needs a better image → representation of violence.

Changes:

↳ Re-ordered presentation to make it more clear
- → what Drone Buddy is ?
- → What controls it → Betaflight
- → How is it controlled → Motion Tracking
- → Surveillance Server
- → Drone Physical Parts Layout
- → How will user interface with it → Mobile App
- → how does covid-19 affect work.

Here are the new graphs and presentation Layout :

Zachary Matthews 10/2/20

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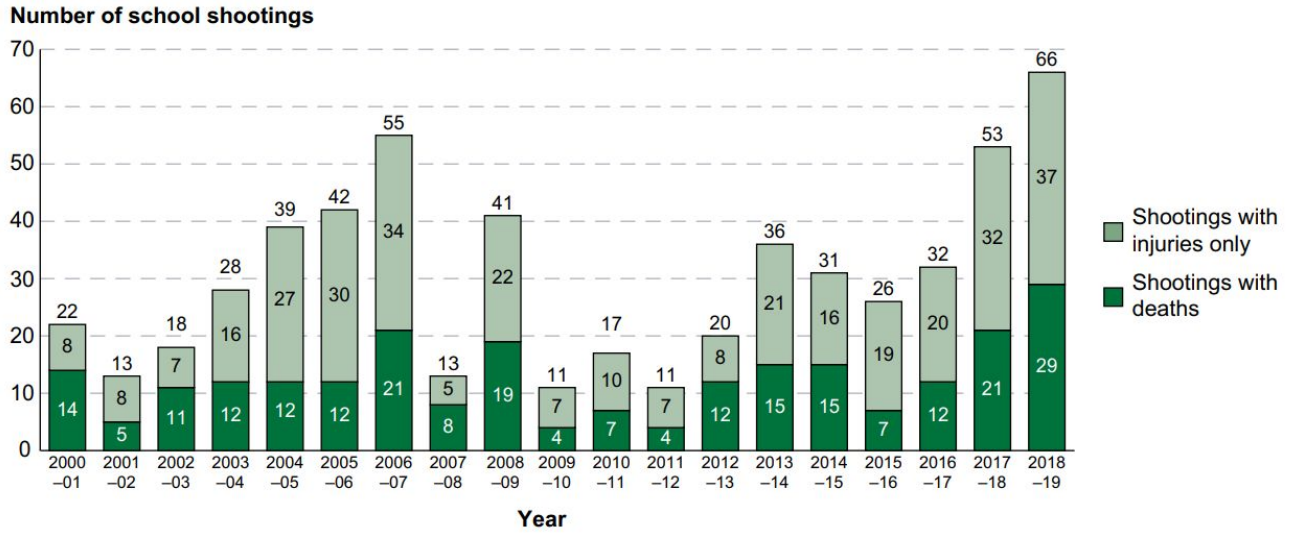
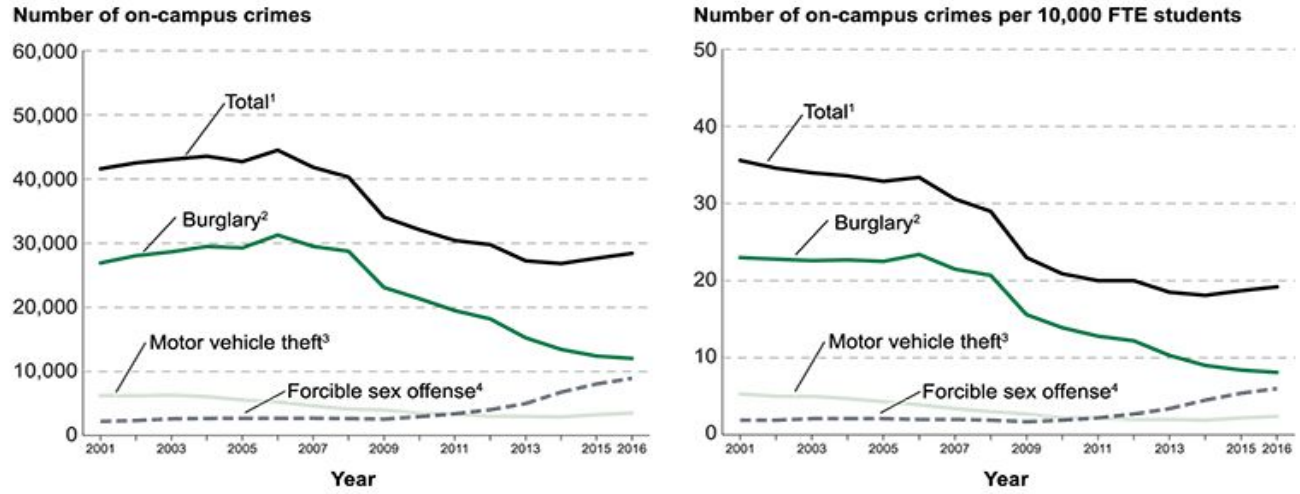
Winessed and Understood by Sirui Yin Date 9/9/20

Recorded by Sirui Yin Date 9/9/20

On Campus Gun Violence Increase:



On Campus Sexual Assault Increase:



[1] Includes other reported crimes not separately shown.

[2] Unlawful entry of a structure to commit a felony or theft.

[3] Theft or attempted theft of a motor vehicle.

[4] Any sexual act directed against another person forcibly and/or against that person's will.

Recorded by: Sahasra Suja

Date: 9/9/20

Title of Activity Team Meeting → Creating Proposal Presentation Video

Title of Project Drone Buddy.

Everybody Present

Old To-Do : ☑ Got Approval for Proposal Presentation from Professor Hasler

Topic : Create Proposal Presentation

Not much happened. Most of us were ~~base~~ prepared to a goode degree

↳ So, we took 2 videos through Blue Jeans

↳ we decided to split the slides 4-ways for the presentation.

Old To-Do : ☑ finish Proposal Presentation Video

Next To-Do :

☑ get Approval for Video

☒ do Q/A ~~session~~

☐ Order parts by 9/27/20

Continued on Page ____

Winessed and Understood by Zodravy Matthews Date 10/2/20

Recorded by Lin Yi Date 9/16/20

Title of Activity Team Meeting → Discussing Parts (short)

Title of Project Drone Buddy

Everyone Present

Old - To-Do :

- [x] Get Approval for Video Proposal Presentation
- [x] ~~do Q/A session~~ → Not necessary

Topics :

→ What parts to order?

↳ Temporary Budget Limit.

→ Decided that in Atlanta everyone would buy 1 part set

→ Since I am at home due to (Covid-19), I will order ONLY some of the parts that I will need for my side of the work

→ Temp. Budget Limit ⇒ $600

↳ for parts.

Individual Task: Order Parts I need — Flight Controller, LTE Module, GPS Module, and Camera

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 10/2/20

Recorded by [signature] Date 9/22/20

Title of Activity My Side of Ordering Parts

Title of Project Drone Buddy

Topic: Order Parts!

Problems Found:

→ Some of the devices may not connect to the flight Controller easily.

→ LTE chip selected has no SIM Card slot OR antenna.

→ Noticed GPS Module is NOT the one advertised on the flight controllers ~~websit~~ website.

Solutions:

→ Realized that a seperate ~~PCI~~ Mini-PCIe bus-to-USB PCB is necessary to get an LTE connection.

↳ This would be insanely hard to do on the flight Controller alone (would need to find device drivers for Beta flight or make ~~them~~ them)

↳ Decided to use Raspberry Pi 3B+ ~~as~~ as an interface between the flight Controller and the LTE chip.

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Witnessed and Understood by Zachary Matthews Date 10/2/20 9/25/20

Recorded by Sebastian Inga Date 9/25/20

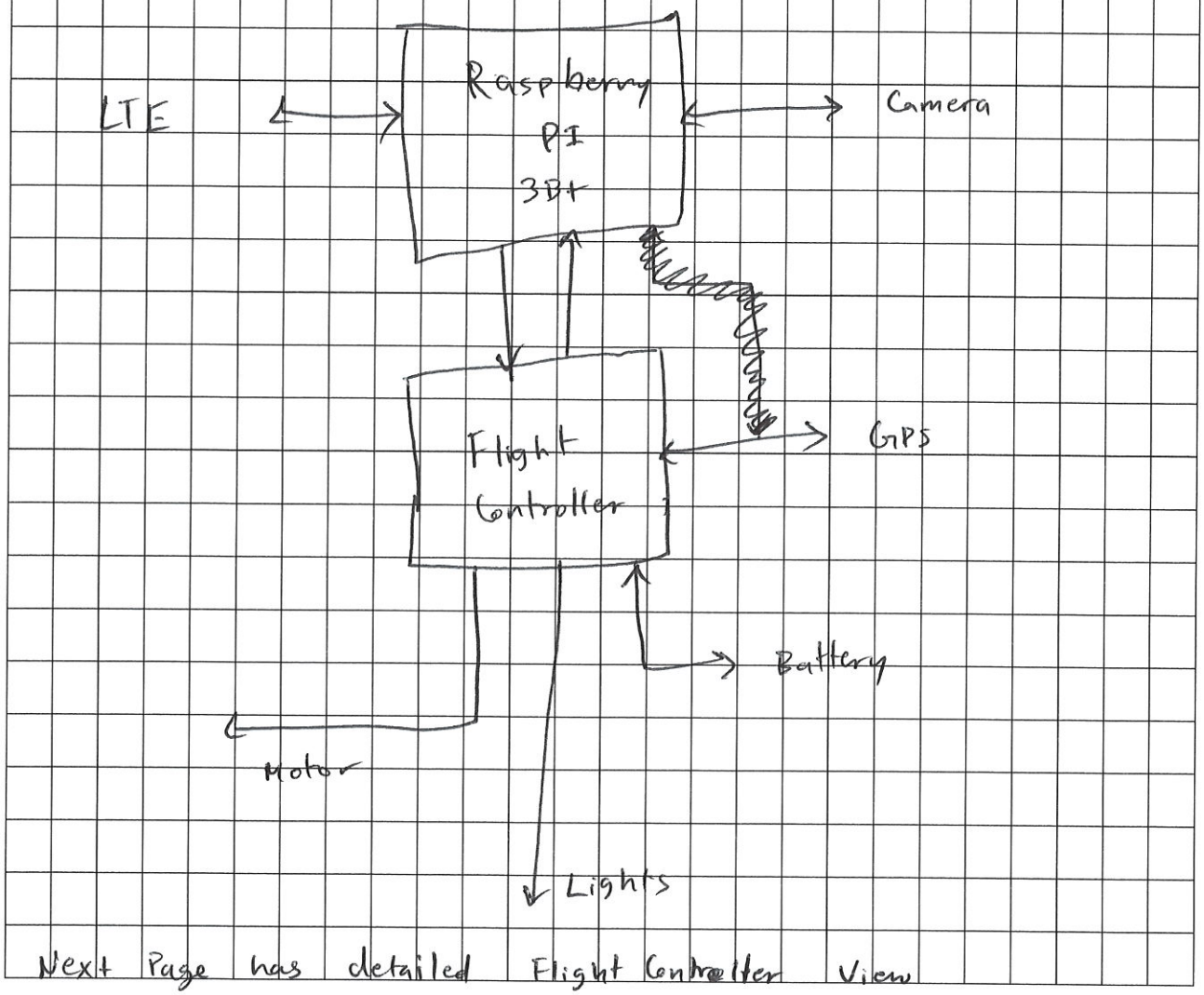
Title of Activity _____

Title of Project Drone Buddy.

→ Added Antenna to parts list

→ Found better GPS Module to work with the flight controller.

New Layout:



Next Page has detailed Flight Controller View

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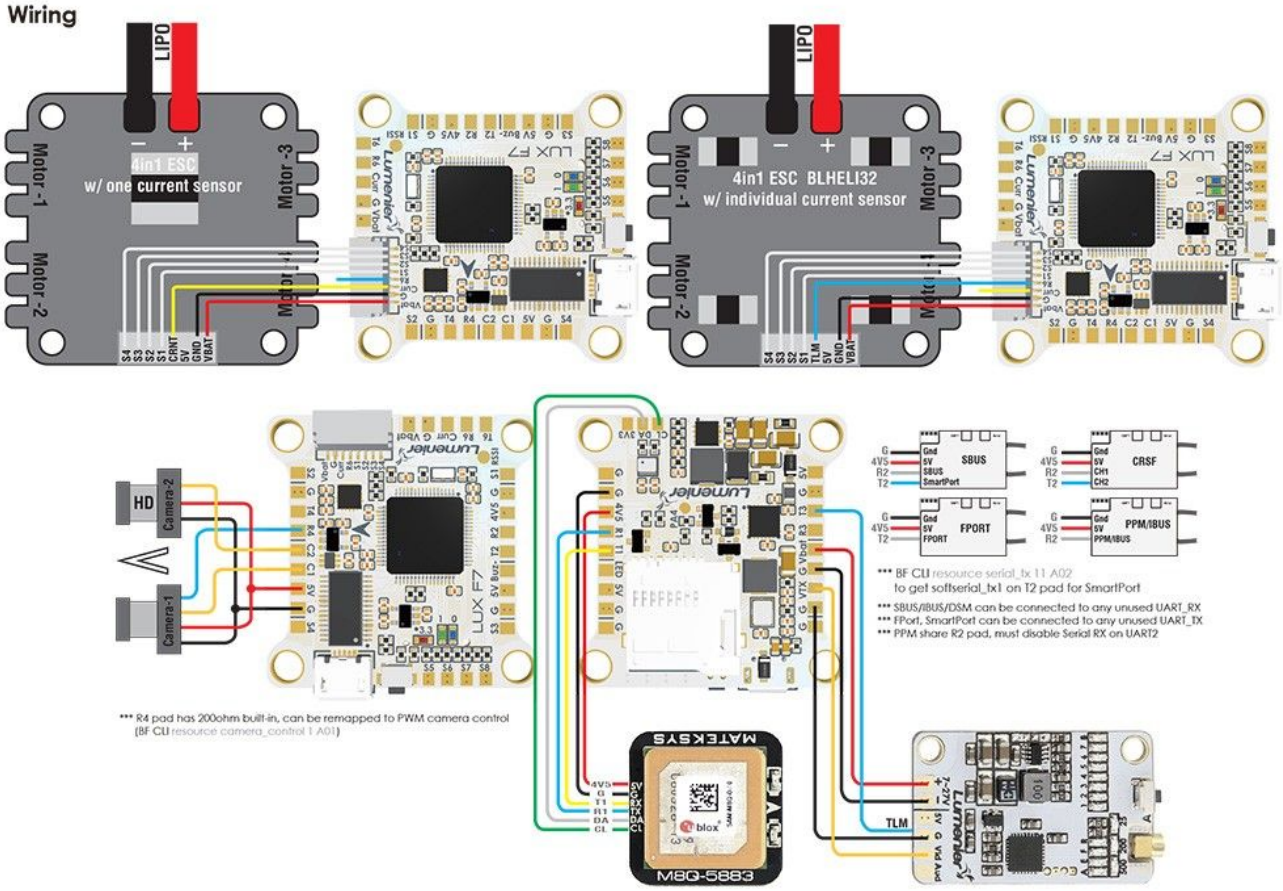
Witnessed and Understood by Zachary Matthews Sebastian Inga Date 10/2/20 9/25/20

Recorded by Sebastian Inga Date 9/25/20

Wiring



Recorded by: Sebastian Lyga

Date: 9/25/20

Title of Activity Team Meeting - Discuss Status Moving Forward

Title of Project Drone Buddy

Talking Points:

→ Current Status
→ Part Integration
→ Reasonable Scope

Attendence
Me
Zachary
George
Prof. Hasler

End Result:

☐ Need to chart out plans for the next 7 weeks → up to the EXPO.

☐ List of Steps to lead to a prototype
↳ In sequential order
↳ to give more light on what we (AN) complete

LIST #1: → Deadline [10/7/20] → Next Meeting
↳ To decide List going forward

☐ Assemble Drone Frame

☐ ~~Beta~~ Build necessary software
↳ Basic Pre-Build of software
↳ Beta flight
↳ Mobile app

Continued on Page ____

Winessed and Understood by Zachary Matthews Date 10/2/20

Recorded by Siddhesh Jain Date 10/2/20

Title of Activity Setting Up LTE Chip with Raspi

Title of Project Drone Buddy

Raspi Commands:

→ lsusb → to check for chip

→ git clone
↳ using adifferent computer

→ Makefile in driver code is errering
↳ Error happening
↳ So I connected to my local wifi

Quectel EC25-A needs a driver
↳ Initial search on GITHUB:
↳ tbaenh85/Quectel_Linux_USB_Driver.git

New Comonads with Wifi:

→ systemctl start ssh

→ sudo apt-get install linux-headers
↳ raspberrypi-kernel-headers

→ make

→ qm_install.sh

→ Reboot

So the make worked. Now testing SIM Card with the Quectel Chip. will test tomorrow.

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Winessed and Understood by George Demmerdez Date 11/25/2020

Recorded by [signature] Date 10/3/20

Title of Activity Setting Up LTE Chip with Raspi

Title of Project Drone Buddy

Testing w/ my personal Verizon Pre-paid SIM card with the Quectel EC25-A LTE Chip.

1. Plugged in Chip with SIM into Raspberry Pi
2. Check for blue blinking light → FOUND !
3. Connected Ethernet cable to SSH into the raspberry Pi → ssh Pi@raspberrypi.local
4. Ping google.com → FAILED → could not resolve hostname
   ↳ Result → NO INTERNET
5. Checked booting logs for the DRIVER
   ↳ $dmesg → Found Driver!
   → The driver seems to have registered the Quectel Chip
   → So attempted to run manual binary quectel-CM
   → failed

8 hrs later

→ Gave up on making Quectel EC25-A Chip
→ Will find an easy replacement!
↳ FOUND: AMAZON ⇒ ZTE-MF833V LTE→USB chip

Continued on Page ____

Winessed and Understood by George Demmerle Date 11/25/2020

Recorded by Asher Snyder Date 10/4/20

Title of Activity Building Betaflight (forked) Repo

Title of Project Drone Buddy

~~wat~~ Purpose: Wanted to get the ball rolling on building the forked betaflight repo

→ Cloned repo on desktop

→ Reading ~~Red~~ Read Me.md → Want to only build betaflight for our Flight Controller
↳ ~~TARGET~~

→ Found target for betaflight
↳ MATEKF722SE

→ Ran build and recorded steps

→ Upon succesful completion
↳ Added script to GitHub CI to get builds out! → increase efficiency

script:

```
make arm_sdk_install TARGET=MATEKF722SE
make TARGET=MATEKF722SE
```

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Winessed and Understood by George Demmerlen Date 11/25/2020

Recorded by Sirisha Sya Date 10/6/20

Title of Activity Testing USB LTE device

Title of Project Drone Buddy

→ Recieved ZTE LTE Module one OCT 7

Put SIM card and tested

↳ Manual says easy plug-in-play

↳ Checked Process and found scruver

↳ Opened local website

↳ says LTE NOT WORKING

→ Tried a couple more times → No LUCK

→ Started email chain with Manufacturer

↳ lier zhu @ gmail.com

↳ found email on Amazon webpage

→ Remainder EXPO coming close!

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Winessed and Understood by George Demmuncker Date 11/25/2020

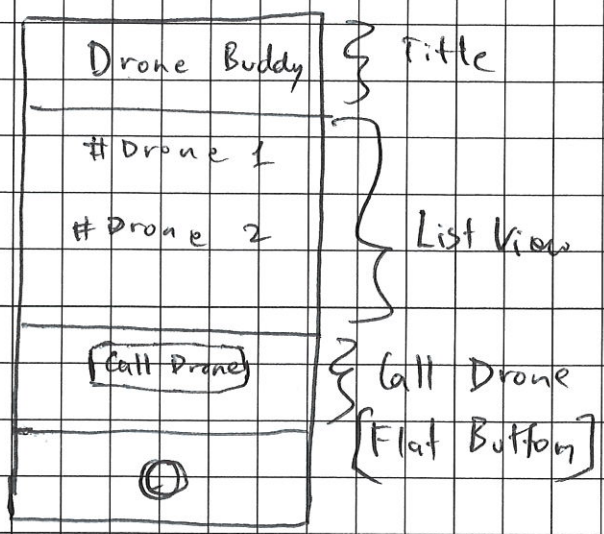
Recorded by [signature] Date 10/19/20

Title of Activity Working on Mobile App

Title of Project Drone Buddy

Using Flutter Version 1.2.2

Layout Idea :



→ Set up a dummy List View
→ Added Title

Since Expo is coming up → Need to plan out weeks better

Met with Jerrin Kakkanatt → To get Progress of project in Atlanta → Drone
→ Seems like Drone is still incomplete → Needs new parts

My Next Goals:

- [x] setup AWS Websockets
- [x] More team Meetings
- [x] Run Betaflight Firmware

Team Goals :

- [x] integrate all parts to drone
- [x] Setting up Camera

Continued on Page ____

Winessed and Understood by George Demmanker Date 11/25/2020

Recorded by [illegible] Date (10/13/20 & 10/14/20)

Title of Activity Running Betaflight Firmware

Title of Project Drone Buddy

Downloaded Betaflight Configurator → to install firmware

→ Attempting to flash firmware (built from GitHub CI)

→ Some driver is missing for Windows and all help instructions are mainly for linux

Tested it on my ~~mac~~ MAC

└→ worked → was able to flash the firmware

IMAGE ON NEXT PAGE!

Also started working on Web Socket phython script.

→ ~~to~~ to AWS LAMBDA

→ AWS API GATEWAY

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Winessed and Understood by George Gennarelli Date 11/25/2020

Recorded by Selin Sji Date 10/19/20

Witnessed and Understood by: George Gennuso Date: 11/25/2020

Recorded by: Sebastian Lyga Date: 10/19/20

Title of Activity Team ~~Not~~ Meetings

Title of Project Drone Buddy

Me, Zachary Mathews, George Germanakos, Jerrin Kakkanatt

Wanted Team to get on same Page :

→ Each one of us explain what has been done

→ look at the upcoming week of works

Outcome / Update :

→ Drone Chassis is Completed.

→ They need to solder some electronic parts to the chassis

→ I have been working on Web Socket Interface

Decisions :

→ Proof - Of - Concept (for drone) : fly it with remote Control

→ Looks for new LTE options if ZTE doesn't pan out.

→ Need to do GPS Latency & Accuracy Testing

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Winessed and Understood by George Germanakos Date 11/25/2020

Recorded by Sir Syed Date 10/20/20

Title of Activity Work with ZTE & Finish App UI

Title of Project Drone Buddy

Based on emails with ZTE Manufacturer (15 emails back-and-forth)

↳ T-Mobile Data-Only SIM Card works best with ZTE ⇒ Its antenna swaths as wide as advertised → My theory

Recieved T-Mobile SIM Today!

→ Tested with ZTE USB and it worked immediately!

→ Updated Team on the results.

Working on App UI Layout

→ added Flat Button to "Call Drone" to UI and linked to function.

→ Got $100 AWS student Credit

→ Creating Python Websocket Scripts

→ Researching Dynamo DB

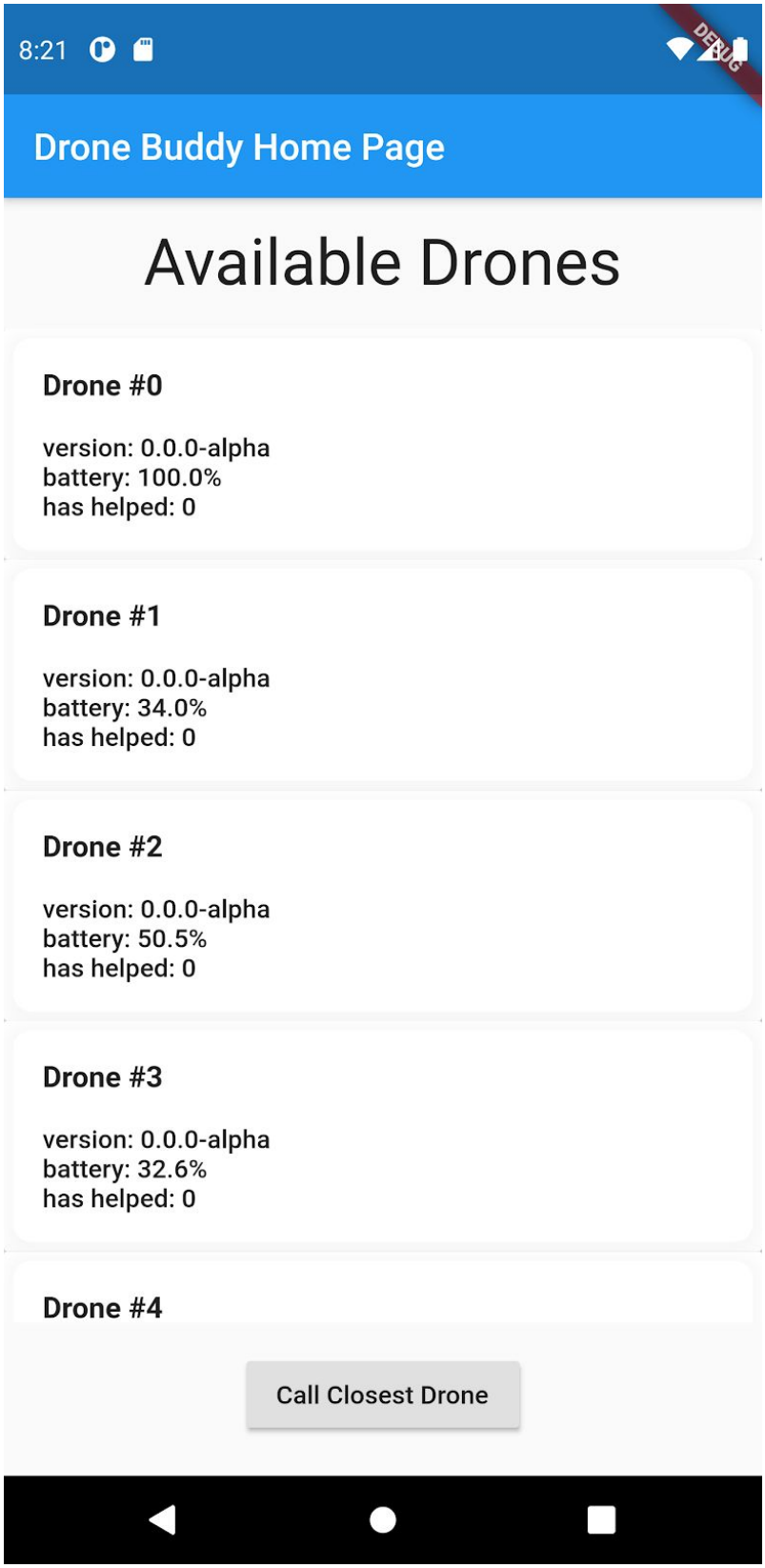
Image of APP on Next Page!

↳ Along with a few of the emails.

Continued on Page 41

Winessed and Understood by George Demmerdas Date 11/25/2020

Recorded by Soiton Yi Date 10/27/20



Witnessed and Understood by: George Gemmeke Date: [redacted] 11/25/2020

Recorded by: Debrosha Dey Date: 10/27/20

Title of Activity Weekly Email → Building Plan

Title of Project Drone Buddy

Broad Plan! (4 weeks to EXPO)

WEEK #1 : → Set up remote controlled flying drone
→ Add AWS Database → with Mobile App
→ Raspberry Pi B Connection

Week #2 : → setup drone's Go-To-Home feature
→ Run Mobile App GPS Latency & Accuracy tests.

WEEK #3 : → Setup Website for electronic deliverables
→ start running tests of Mobile App connections with Raspberry Pi.
→ Add video streaming

WEEK #4 : → Create EXPO presentation
→ Video Poster Board
→ Create Drone Video Tests
↳ To Youtube
→ www.capstone.gatech.edu

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Winessed and Understood by George Demmanker Date 11/25/2020

Recorded by [signature] Date 10/27/20

Title of Activity Working on DynamoDB & Email Update

Title of Project Drone Buddy

Adding New DynamoDB scripts to main websocket

↳ Created seperate script for DB accesses

→ All history on GIT REPO

Features:

- Updating GPS Data
- Adding Users & Drones
- Sending Data from a User to a drone
- Pinging & Ponging

Next Steps:

- [x] Test drone with ~~drone controller~~ Go-To Home feature
- [x] Make App use AWS data and GPS updates
- [x] Drone to get GPS Websocket updates
- [x] Accept Video files to S3 Bucket
- [x] Run GPS Accuracy & Latency Tests.

Continued on Page ____

Winessed and Understood by George Demmerle Date 11/25/2020

Recorded by Seiko Date 11/3/20

Title of Activity Video Streaming from Drone

Title of Project Drone Buddy

Decided to Use Pi Camera to easily connect to RaspBerry Pi for testing

Streaming

- Using gstreamer (Uses Raspi OpenMAX → Hardware encoding)
- RTMP packets
- Using Kinesis Video Streams (AWS)

Ran simple AWS test w/s kvsink (AWS Example)
→ got small recorded / live stream video

IMPORTANT TEST: Gstreamer Avg CPU utilization: 15% (Good)

Meeting with Prof. Hasler:
→ Me
→ Zachary Mathews

Spoke heavily on EXPO. Told us that she will grade us based on the EXPO Presentation alone!
- Asked about some details
- Need videos of flying drone → a important task

Also spoke about the height of the flying drone and the gps latency to the drone

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Winessed and Understood by George Demmuder Date 11/25/2020

Recorded by Nicholas Date 11/9/20

Title of Activity Weekly Email Update

Title of Project Drone Buddy

COVID-19 taking its toll

Based on remaining work:

- [ ] Need to create presentation for Expo
- [ ] Test Drone Flight at intended height
- [x] Make sure livestream video is accessible to a website & stored in S3 bucket
- [ ] Test GPS Latency
- [x] Test Go-To-Home Feature
- [ ] Feature: Reserve drone from App Dynamically

→ Currently working on GPS transfer from Phone to Raspberry Pi

→ Set up transfer from websocket LAMBDA function straight to Drone #1 for a test

Test Sample for GPS Latency from Phone → RPI →

next page

Continued on Page 46

Winessed and Understood by George Demmerle Date 11/25/2020

Recorded by [signature] Date 11/10/20

```
Successful Long Test (CORRECT PARAMETERS) #2:
1.  [2020-11-11 0:48:38::36]  ->   [2020-11-11 00:48:39::314]    1s 278ms   1278
2.  [2020-11-11 0:48:39::50]  ->   [2020-11-11 00:48:40::591]    1s 541ms   1541
3.  [2020-11-11 0:48:40::113]  ->  [2020-11-11 00:48:41::091]    0s 978ms   978
4.  [2020-11-11 0:48:41::110]  ->  [2020-11-11 00:48:42::194]    1s  84ms   1084
5.  [2020-11-11 0:48:42::84]  ->   [2020-11-11 00:48:43::475]    1s 391ms   1391
6.  [2020-11-11 0:48:43::84]  ->   [2020-11-11 00:48:44::435]    1s 351ms   1351
7.  [2020-11-11 0:48:44::95]  ->   [2020-11-11 00:48:45::394]    1s 299ms   1299
8.  [2020-11-11 0:48:45::110]  ->  [2020-11-11 00:48:46::195]    1s  85ms   1085
9.  [2020-11-11 0:48:46::98]  ->   [2020-11-11 00:48:47::315]    1s 217ms   1217
10. [2020-11-11 0:48:47::102]  ->  [2020-11-11 00:48:48::274]    1s 172ms   1172
11. [2020-11-11 0:48:48::75]  ->   [2020-11-11 00:48:49::234]    1s 159ms   1159
12. [2020-11-11 0:48:49::80]  ->   [2020-11-11 00:48:50::194]    1s 114ms   1114
13. [2020-11-11 0:48:50::81]  ->   [2020-11-11 00:48:51::231]    1s 150ms   1150
14. [2020-11-11 0:48:51::77]  ->   [2020-11-11 00:48:52::114]    1s  37ms   1037
15. [2020-11-11 0:48:52::94]  ->   [2020-11-11 00:48:53::394]    1s 300ms   1300
16. [2020-11-11 0:48:53::79]  ->   [2020-11-11 00:48:54::354]    1s 275ms   1275
17. [2020-11-11 0:48:54::85]  ->   [2020-11-11 00:48:55::311]    1s 226ms   1226
18. [2020-11-11 0:48:55::96]  ->   [2020-11-11 00:48:56::275]    1s 179ms   1179
19. [2020-11-11 0:48:56::98]  ->   [2020-11-11 00:48:57::234]    1s 136ms   1136
20. [2020-11-11 0:48:57::78]  ->   [2020-11-11 00:48:58::515]    1s 437ms   1437
21. [2020-11-11 0:48:58::80]  ->   [2020-11-11 00:48:59::474]    1s 394ms   1394
22. [2020-11-11 0:48:59::80]  ->   [2020-11-11 00:49:00::434]    1s 354ms   1354
23. [2020-11-11 0:49:0::99]  ->    [2020-11-11 00:49:01::106]    1s   7ms   1007
24. [2020-11-11 0:49:1::90]  ->    [2020-11-11 00:49:02::350]    1s 260ms   1260
25. [2020-11-11 0:49:2::88]  ->    [2020-11-11 00:49:03::314]    1s 226ms   1226
26. [2020-11-11 0:49:3::115]  ->   [2020-11-11 00:49:04::273]    1s 158ms   1158
27. [2020-11-11 0:49:4::82]  ->    [2020-11-11 00:49:05::235]    1s 153ms   1153
28. [2020-11-11 0:49:5::93]  ->    [2020-11-11 00:49:06::175]    1s  82ms   1082
29. [2020-11-11 0:49:6::83]  ->    [2020-11-11 00:49:07::474]    1s 391ms   1391
30. [2020-11-11 0:49:7::91]  ->    [2020-11-11 00:49:08::433]    1s 342ms   1342
31. [2020-11-11 0:49:8::76]  ->    [2020-11-11 00:49:09::393]    1s 317ms   1317
32. [2020-11-11 0:49:9::94]  ->    [2020-11-11 00:49:10::353]    1s 259ms   1259
33. [2020-11-11 0:49:10::81]  ->   [2020-11-11 00:49:11::425]    1s 344ms   1344
34. [2020-11-11 0:49:11::83]  ->   [2020-11-11 00:49:12::273]    1s 190ms   1190
35. [2020-11-11 0:49:12::88]  ->   [2020-11-11 00:49:13::233]    1s 145ms   1145
36. [2020-11-11 0:49:13::97]  ->   [2020-11-11 00:49:14::189]    1s  92ms   1092
37. [2020-11-11 0:49:14::94]  ->   [2020-11-11 00:49:15::473]    1s 379ms   1379
38. [2020-11-11 0:49:15::103]  ->  [2020-11-11 00:49:16::190]    1s  87ms   1087
39. [2020-11-11 0:49:16::72]  ->   [2020-11-11 00:49:17::393]    1s 321ms   1321
40. [2020-11-11 0:49:17::86]  ->   [2020-11-11 00:49:18::353]    1s 267ms   1267
41. [2020-11-11 0:49:18::79]  ->   [2020-11-11 00:49:19::313]    1s 234ms   1234
42. [2020-11-11 0:49:19::77]  ->   [2020-11-11 00:49:20::273]    1s 196ms   1196
43. [2020-11-11 0:49:20::78]  ->   [2020-11-11 00:49:21::072]    0s 994ms   994
44. [2020-11-11 0:49:21::99]  ->   [2020-11-11 00:49:22::201]    1s 102ms   1102

AVERAGE = 1220.523 ms
```

Witnessed and Understood by: George Gemmecker Date: 11/10/20

Recorded by: Sebastian Lyse Date: 11/10/20

Title of Activity GPS Format

Title of Project Drone Buddy

Found out the Flight Controller uses GPS format **NMEA GPGGA**

→ My data was only latitude, Longitude, Altitude

Format: "trimble.com/OEM_RecieverHelp/V4.44/en/NMEA-0183messages_GGA.html"

→ converted → to get UTC time
→ get degrees for Lat & Long
→ Accuracy → in meters (HDOP)
→ Altitude → in meters
→ CHECKSUM (was tough to implement in DART)

Example Produced from APP:

"$GPGGA,123756.00,--.---,N,---.---,W,05,05,6.1479,208.0,M,,,,*0A"

Continued on Page ____

Winessed and Understood by George Demmerler Date 11/25/2020

Recorded by Richard Spin Date 11/11/20

Title of Activity We Last Week Planning

Title of Project Drone Buddy

Last Week of Semester Classes and Expo is coming.

→ NEED a working video of the drone following someone.

→ Planning to add 2 new features to AWS & Mobile App

↳ AWS → easy livestreaming access and storage to S3 Bucket.

↳ allow Mobile App to reserve drone through ~~drone~~ AWS Lambda

→ Decided to meet Friday & Sunday for presentation

Continued on Page ____

Winessed and Understood by George Gemmeke Date 11/25/2020

Recorded by Sirish Sji Date 11/17/20

Title of Activity Group Meeting

Title of Project Gr Drone Buddy

Attendees: Zachary Mathews, Me, Jerrin Kakkanat, George Germanatos

- Unfortunately previous tests on Thursday have failed due to bad wire connection.
- Discused status
  - Zachary fixed the bad wiring and will go out to test later today.

Decided that getting drone to fly is ~~not~~ more important before practicing presentation.

- Will meet to practic later (Sunday evening)

Continued on Page ____

Winessed and Understood by George Germanatos Date 11/25/2020

Recorded by Jsi Date 11/20/20

Title of Activity Flight Controller is Bricked!

Title of Project Drone Buddy.

* On ~~st~~ saturday the Magnotometer failed to give any good / useable data.
* Setup up Gstreamer on the drone for streaming
* This morning Zachary tried to Flash the Flight Controller and it ended up getting BRICKED.
  - They did not have a second flight Controller.
  - I have 2 with me in Indiana. (No Gratch)

→ Email Advisor on situational updat

GROUP MEETING @ Attendees → Me, Zachary, Jerrin, George

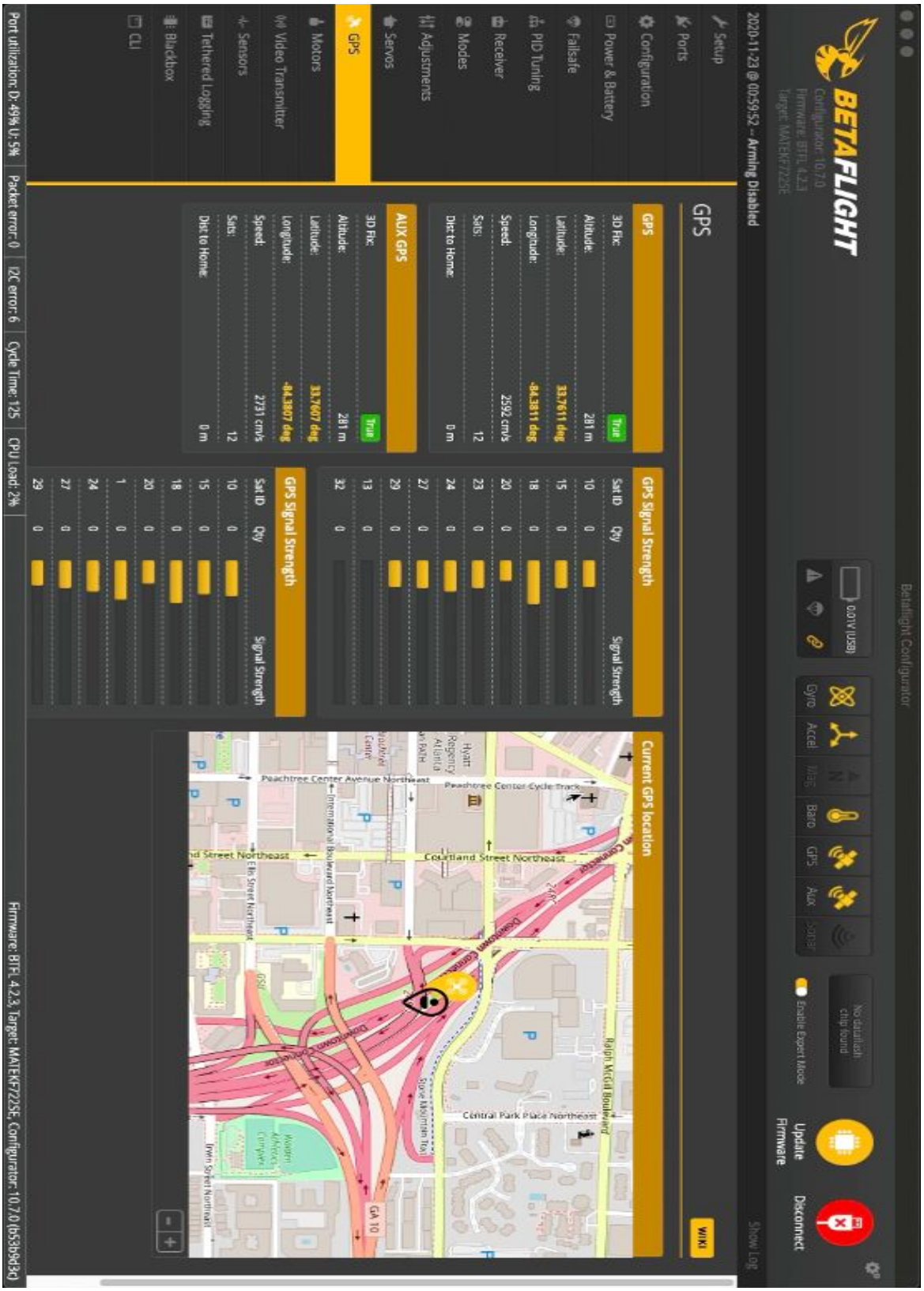
→ Decided to get Flight Controller working on My end → In an emulated fashion.
  - → solder FC
  - → Provide it with Fake GPS data for user & Drone.
  - → Use MBED and SD Card for GPS Emulation
  - → ~~Bro~~ GOT IT TO WORK AFTER 8-10 hrs of work! Made a video of Prove
  - → Picture on next page

→ In the meantime, George and Jerrin are working on the very important EXPO Presentation!

Continued on Page 51

Winessed and Understood by George Gummadi Date 11/25/2020

Recorded by [signature] Date 11/22/20



Witnessed and Understood by: George Gennuso Date: 11/22/20

Recorded by: Sebastian Lyga Date: 11/22/20

Title of Activity Expo Presentation

Title of Project Drone Buddy

Realized at 1 AM that the Poster/video for the expo is due at 9 AM and not 3 PM!

- All quickly scrambled online to prepare av video & submit!

Expo

- After some preparation.
- Wore Blazers & Ties
- Gave presentations!
  - Idea and work seems to be accepted and lauded as a novel and good idea.

Dr. Hosler looked at the presentation as a Final presentation :)

DONE!

Continued on Page ____

Winessed and Understood by George Demmerdes Date 11/25/2020

Recorded by [signature] Date 11/23/20