

Tilt Wing UAV with Touch Screen Telemetry Display

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What Our Project Is

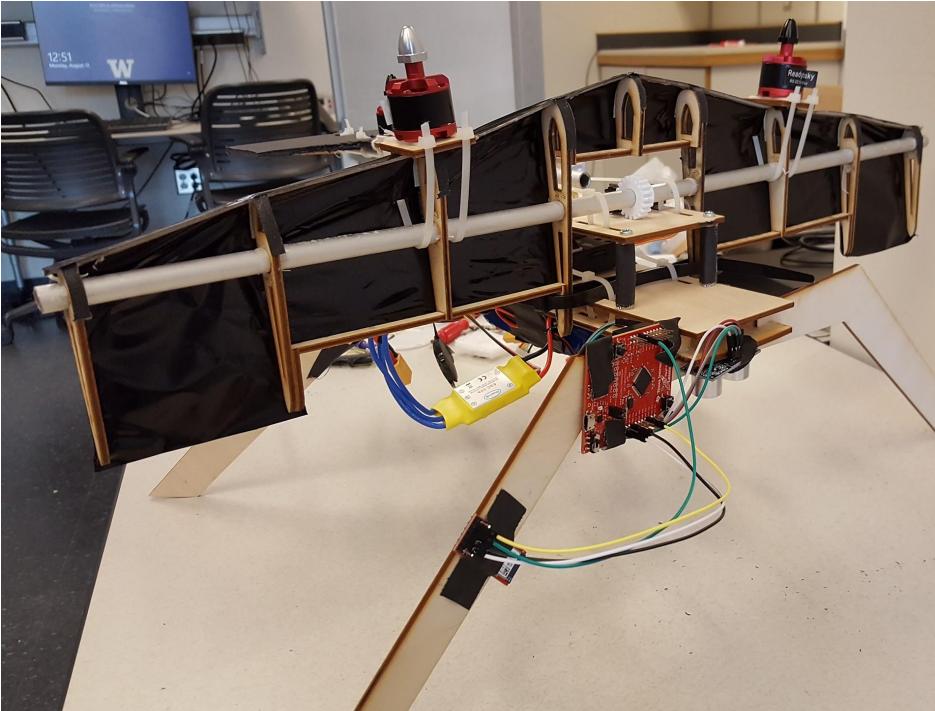
- Create a drone that transitions from vertical to horizontal flight
- Send and display data to the user
 - Altitude
 - GPS Location
- Capture and log relevant data

Purpose Of The Project

- To extend the range of VTOL drones
- Being able to gather data from a drone in real-time
- Provide a user-friendly method of viewing data
- Log and analyze flight data
- Learn how to integrate an aerial embedded system

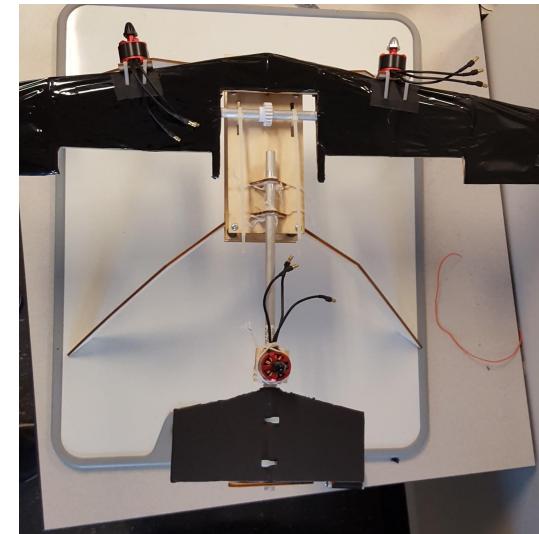
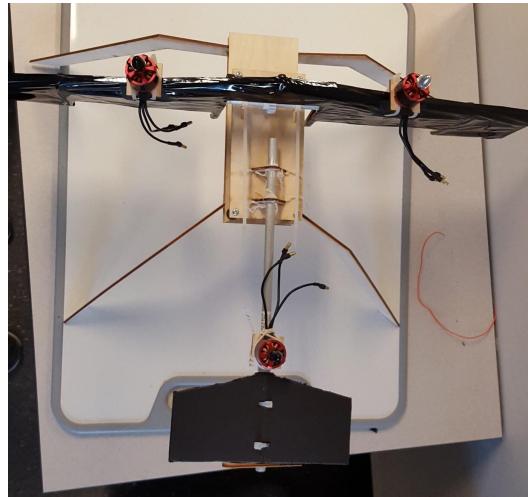
The Tilt Wing UAV

- Tricopter configuration
- Wing tilts to enable horizontal flight
- On-board Tiva microcontroller, bluetooth, and ultrasonic sensor

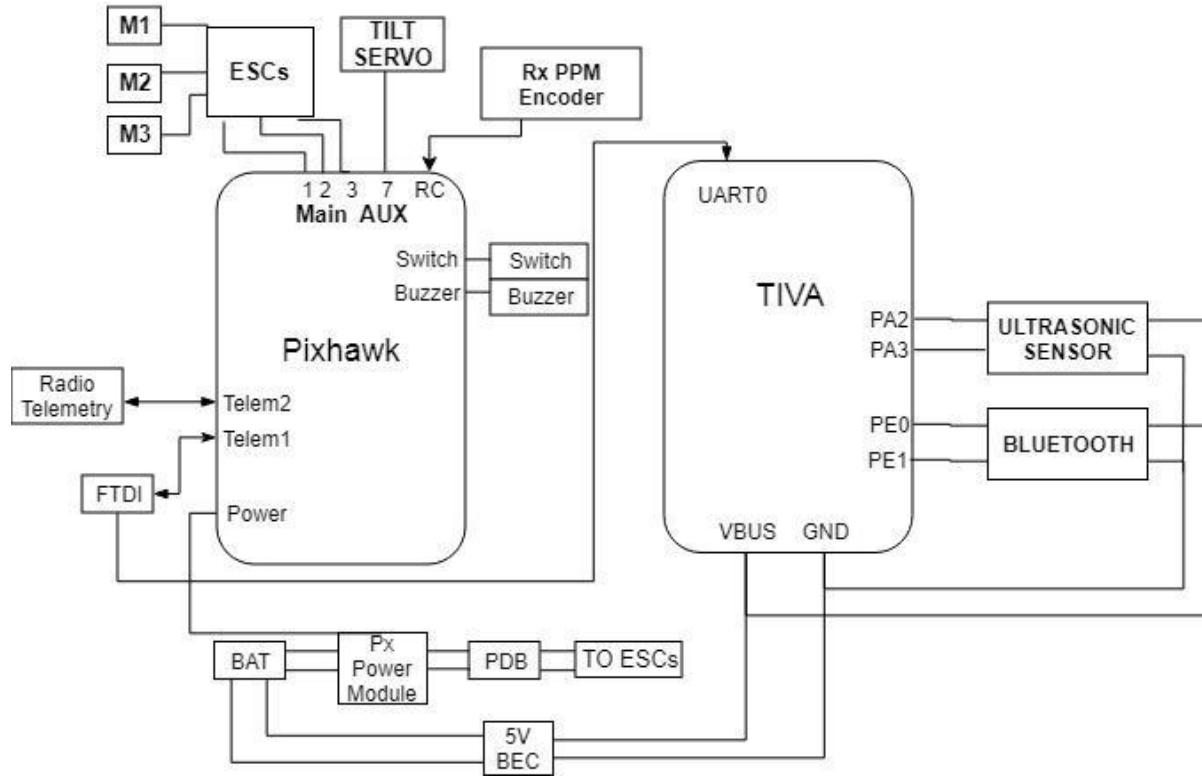


Flight Profile

- Vertical takeoff
- Transition to horizontal flight
- Transition back to hover
- Vertical landing

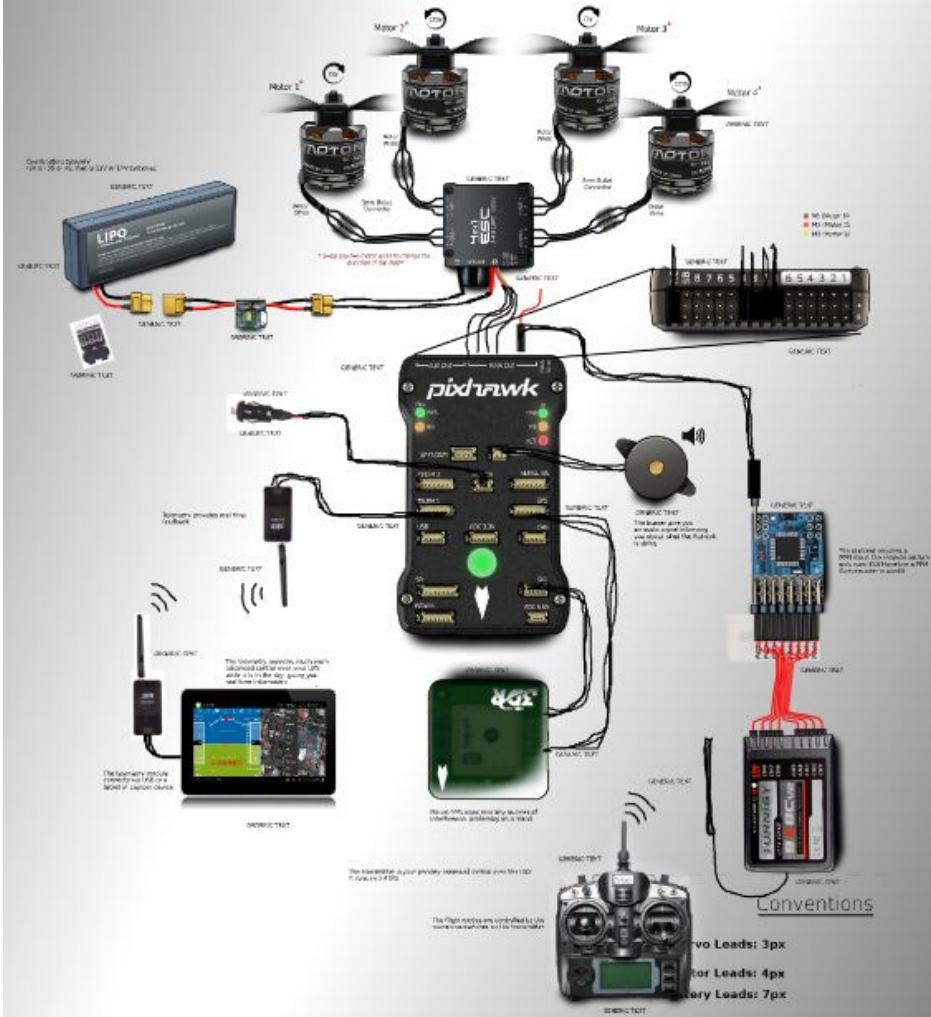


Drone Wiring Diagram



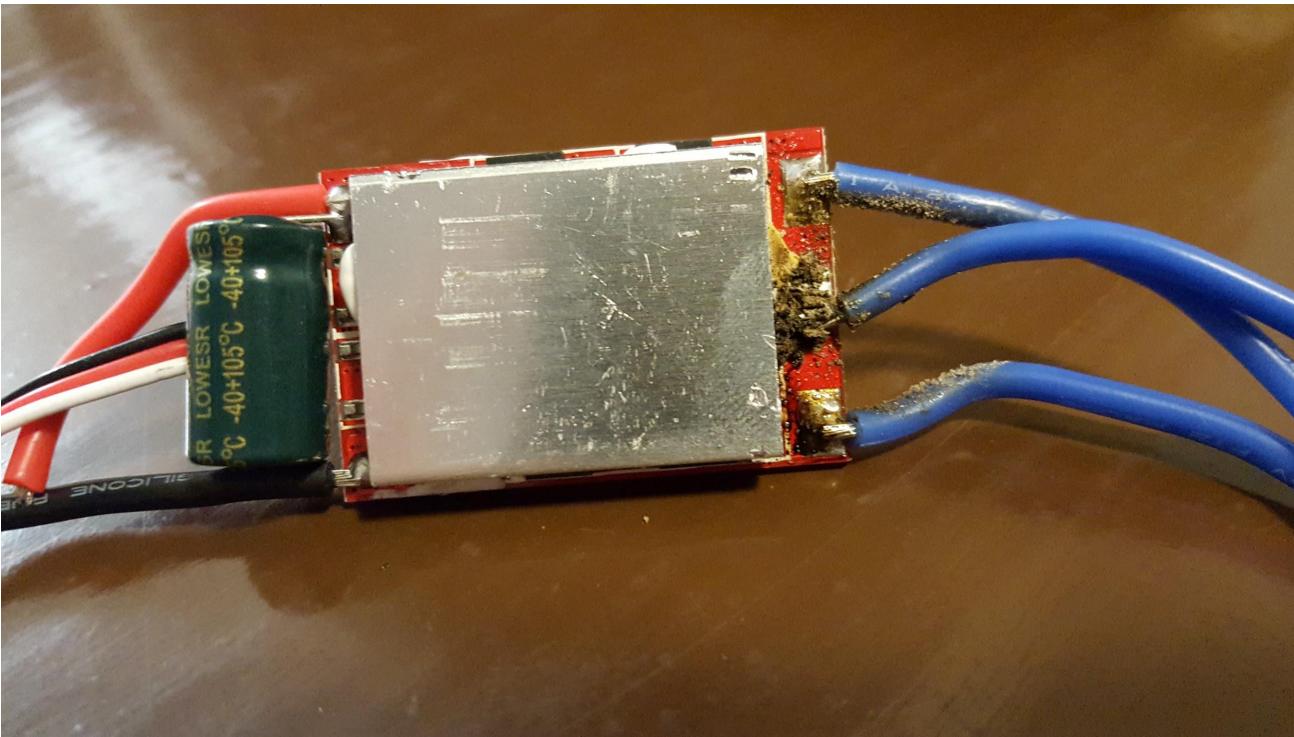
Open-Source Avionics

- Used by:
 - Hobbyists
 - Researchers
 - Commercial/Defense
 - NASA
- Adaptable Firmware



Q_ENABLE	1	Enable quadplane support	Q_TILT_RATE_UP Q_TILT_RATE_DOWN	25 10	Max speed (in degrees per second) that the wing will tilt
Q_FRAME_CLASS	7	Define for tricopter			
Q_TILT_MASK	3 (motor 1 + motor 2)	Applies a bitmask that defines which motors can tilt			
Q_THR_MIN_PWM, Q_THR_MAX_PWM	985 1750	Define distinct PWM ranges for the tilting motors			
Q_TILT_TYPE	1 - Binary 2 - Vectored	Define tilt type to binary for direct horizontal to vertical tilting. Define as vectored for steady tilt-over (requires an additional PID curve0			
SERVO6_FUNCTION	41	Define for single tilting control with auxiliary channel 6			
Q_TILT_MAX	30	Set maximum tilt in degrees before vehicle will transition to horizontal flight			

Electronic Speed Controller Failure



Mavlink Communication Protocol

- Tried wired and wireless connection
- Only able to get █ and other random characters
- Decided to use another type of data



Ultrasound Sensor Data



- Used a Ultrasound Sensor for distance data
- Sends out a high-frequency sound pulse and waits for echo of sound

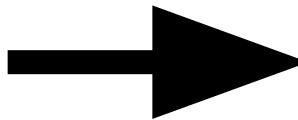
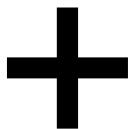
Bluetooth

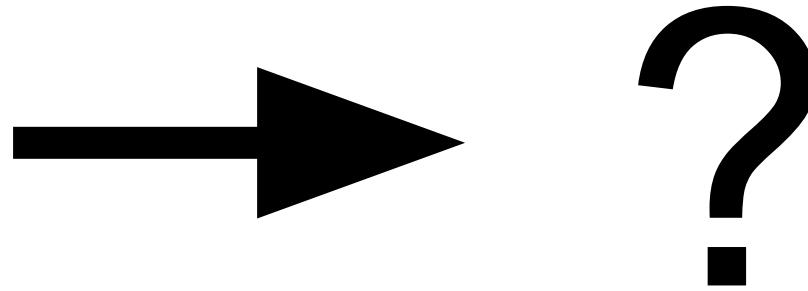
- Achieve wireless communication
- Configured using PuTTY software
- Able to receive and transmit data from the TIVA board to phone app through UART



RTOS Integration

Manages the data capture, cleaning, and transmission

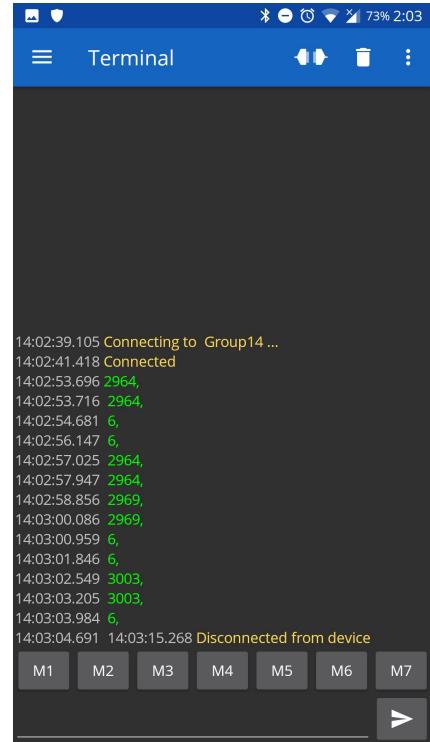




We needed a way to view and log our data over bluetooth

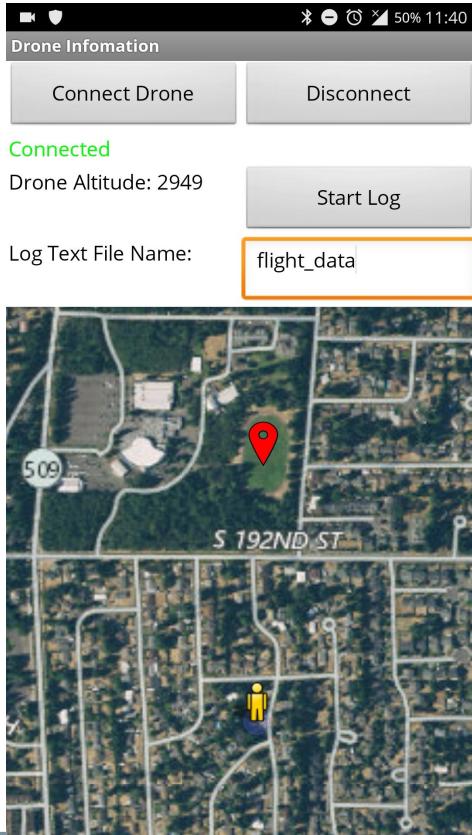
Testing Android Bluetooth Connection

- Serial Bluetooth Communication app by Kai Morich
- Just for testing if we were able to read data to a phone



*Serial Bluetooth Communication app
by Kai Morich*

Created Our Own App



Our app is able to:

- Connect to bluetooth module
- Receive data
- Log data to a text file
 - User can name text file

How it works

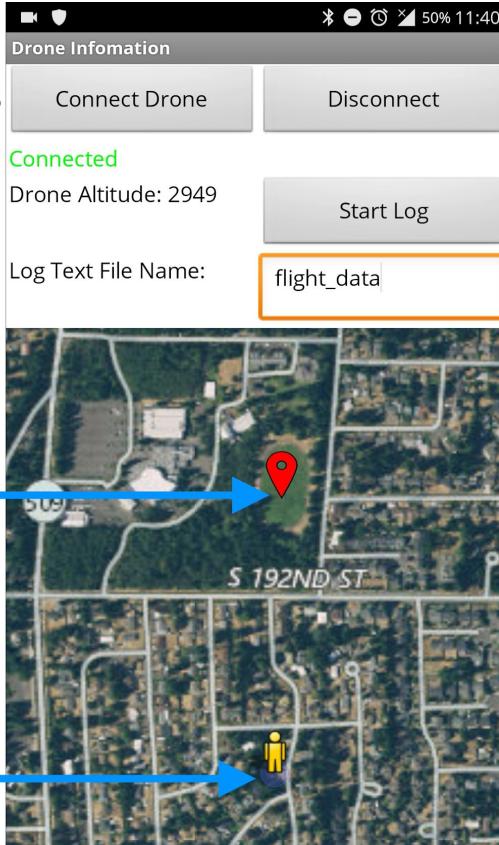
List of paired
bluetooth devices

Connection Status

Current Data →

Location of Drone

Location of User



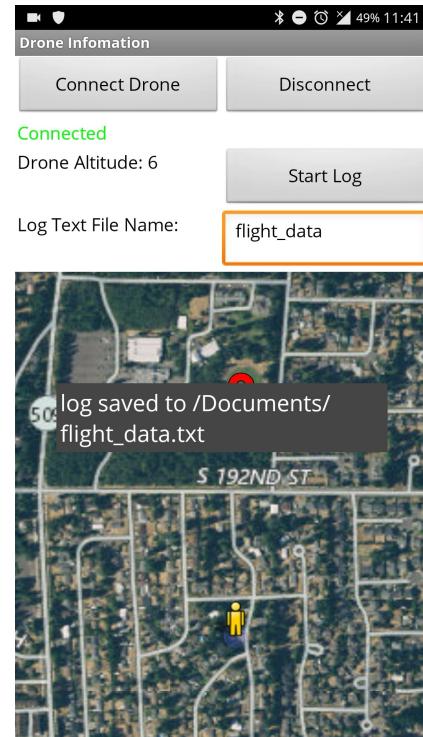
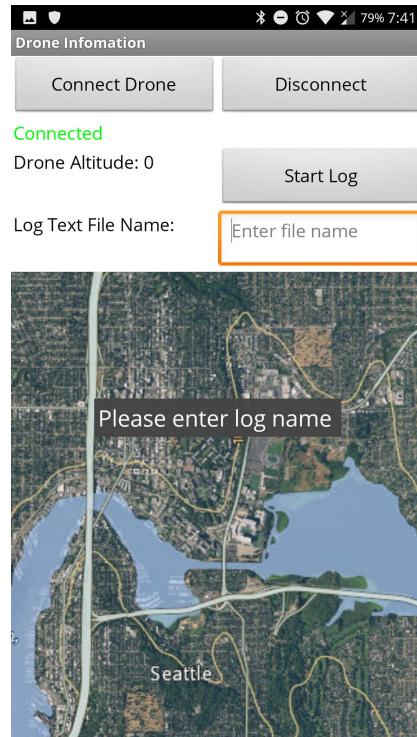
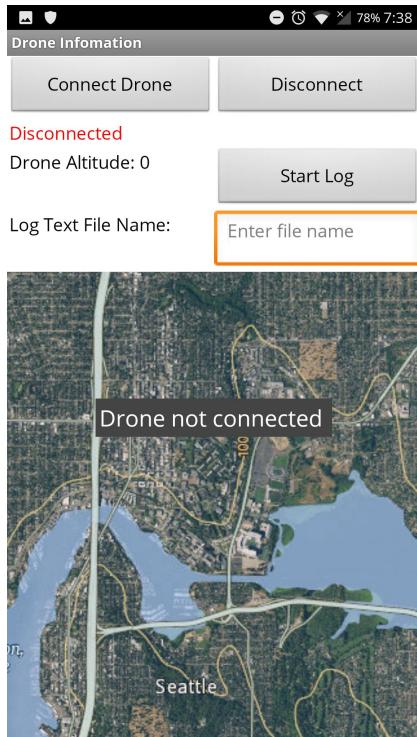
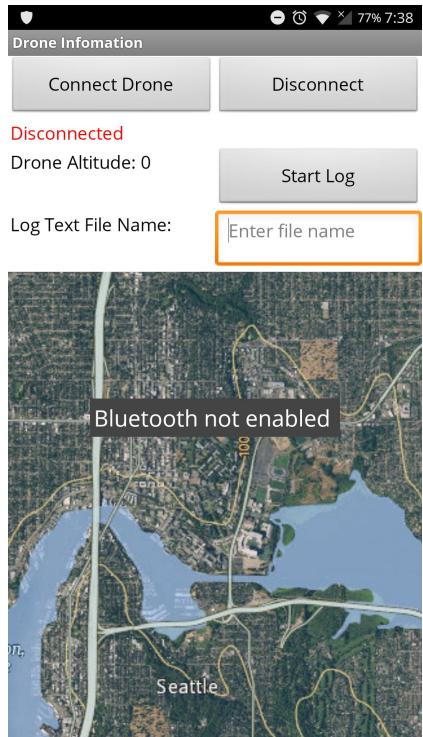
Disconnect bluetooth
device from app

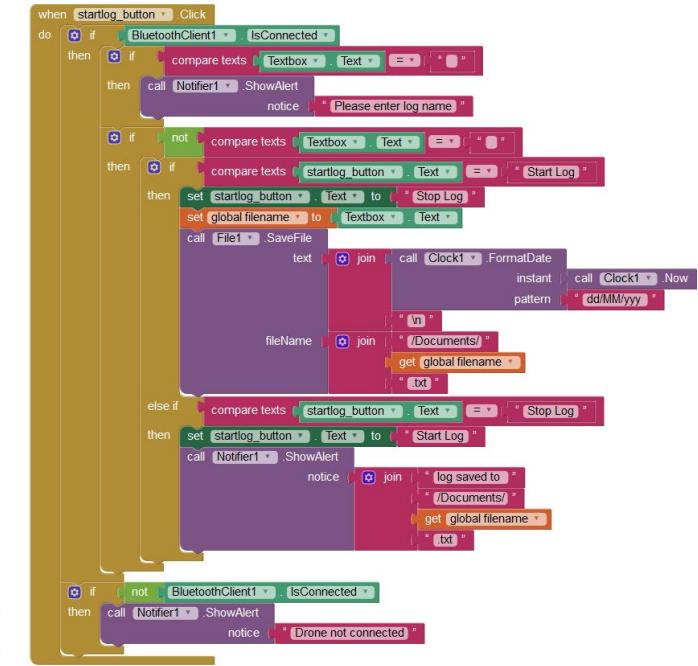
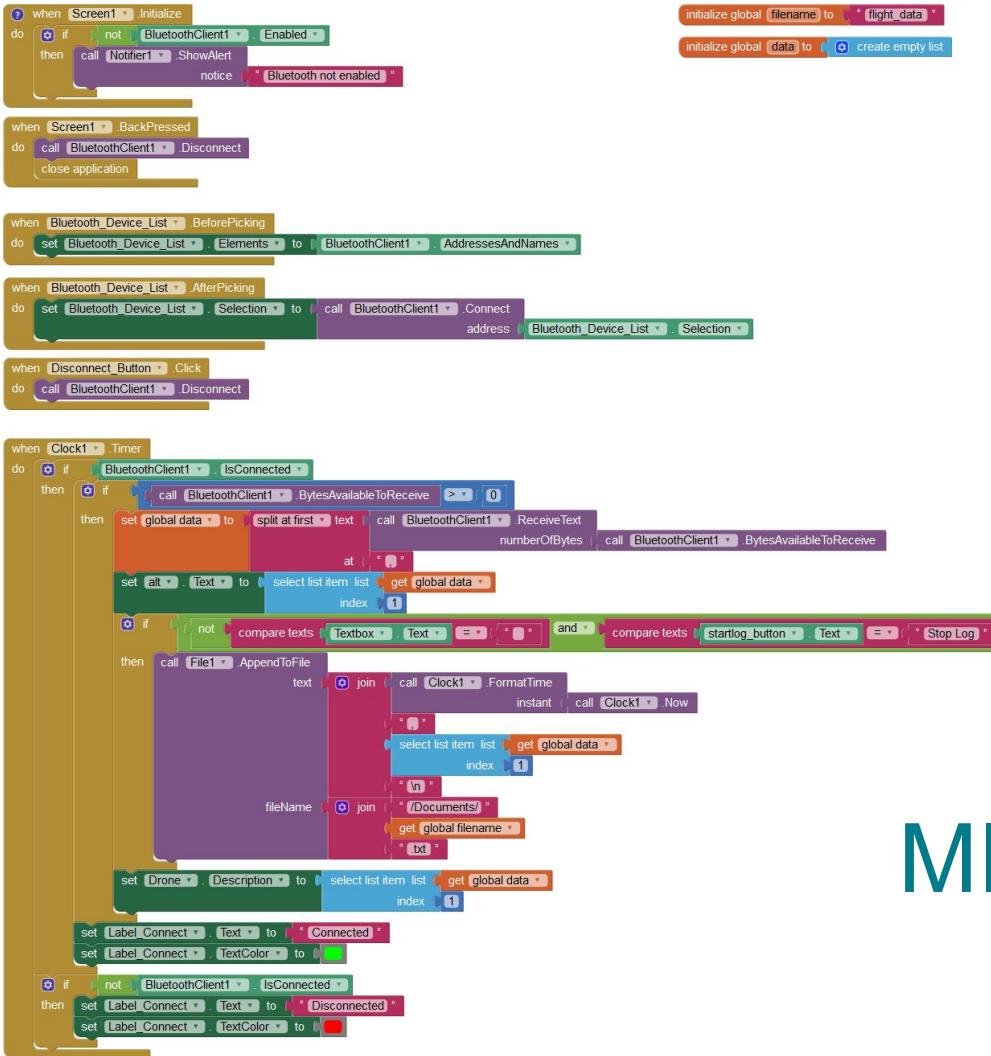
Start logging data

Name of log file

Map from OpenMaps

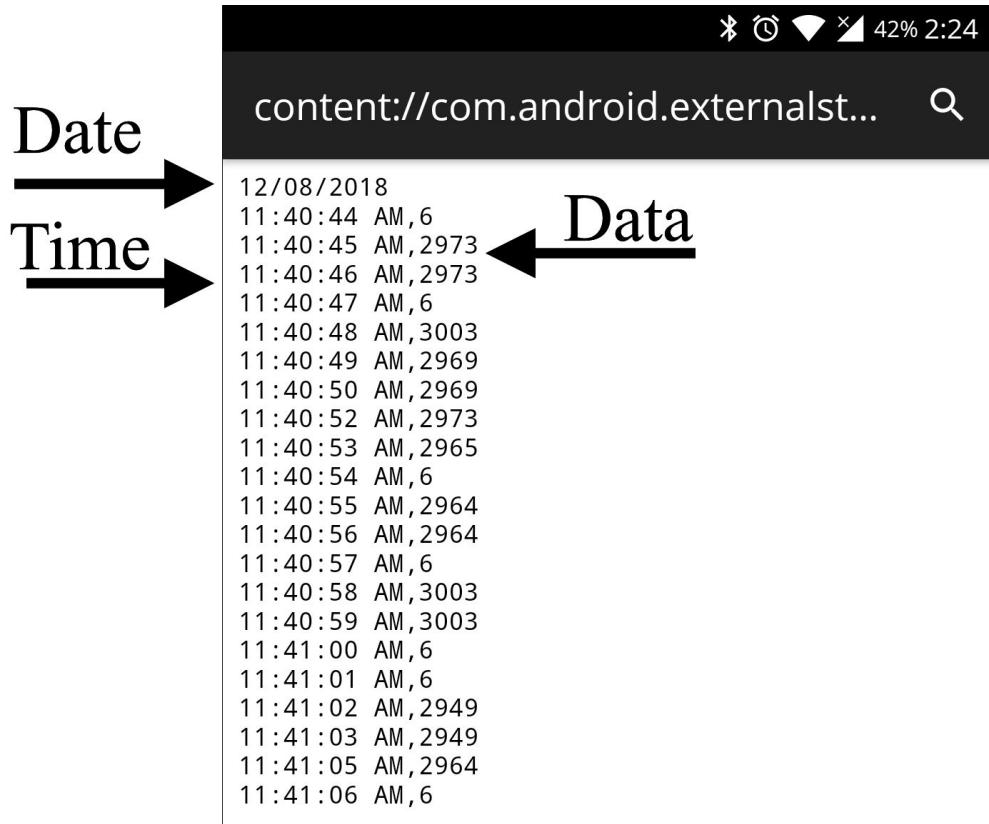
Helper Messages





MIT's App Inventor “Block View”

Log File



- Log file saved to Documents folder
- Consists of:
 - Date
 - Time that the data is saved
 - Data

Conclusion

- Were able to build a drone
- Unable to gather the altitude and gps data
- Were able to get ultrasound data
- Were able to send and receive data over bluetooth
- Created a phone app

Steps Required for Completion

- Replace faulty ESC and affirm function through flight tests
- Communicate over MAVLink
- Show MAVLink data on the app