Main Documentation

It is suggested that the documentation be read in this order:

Safety-related Documents:

* *Battery Documentation*
* *Test Safety Documentation*
* *Test Bench Documentation*

High-level Documents

* Quick Start Guide
* *Raspberry Pi Documentation*
* *Code Documentation*
* *Control Documentation*
* *Modeling Documentation*
* *Vicon Documentation*
* *MotorCharacterization.m*
* *Drone Parameters.xlsx*
* *Drone Network Decomposition*

Component-level Documents

* *Drone Frame Documentation*
* *Buck Converter Documentation*
* *Relay Documentation*
* *Battery Voltage Measurement Documentation*
* *ESC Documentation*
* *Motor Documentation*
* *IMU Documentation*

*Suggested System Improvements*

*Suggested rotor speed measurements*

References

* *Lukkonen*
* *Mahony*

The remainder of this document provides

* Parts list
* Full wiring diagram
* Bottom baseplate schematic
* Top plate schematic

Parts list:

* [F450 Drone Frame Kit](https://a.co/d/2GxR3Mw) $20
* [Raspberry Pi 4b Board (64-bit with WiFi, 2GB)](https://a.co/d/chRoueE) $50
* [32-bit microSD Card with Adapter](https://a.co/d/eFLcQGJ) $9
* [GeeekPi Prototype Breakout DIY Breadboard PCB Kit for Raspberry Pi 4b](https://www.amazon.com/GeeekPi-Prototype-Breakout-Breadboard-Raspberry/dp/B07MCX54ZD?pd_rd_w=Bfxeh&content-id=amzn1.sym.15d5b68b-7dc9-4582-9d4e-256fb97eea2d&pf_rd_p=15d5b68b-7dc9-4582-9d4e-256fb97eea2d&pf_rd_r=TB49TBA8HEV554Y7KXKF&pd_rd_wg=0Hn5d&pd_rd_r=bb8f4b17-e5f6-4c76-9c82-ee794e403626&pd_rd_i=B07MCX54ZD&ref_=pd_bap_d_grid_rp_0_3_t&th=1) $3.25/ea
* [4 x HobbyPower 30A Brushless ESCs (BEC type only)](https://a.co/d/guXeRYp) $36
* [4 x ReadyTosky F450 Quadcopter Motors](https://a.co/d/dc0cUB0) $40
* [4 x 1045 Propellers](https://a.co/d/8WvIfbS) $15
* [11.1 V LiPo Battery, 3000mAh with Deans T Connector](https://a.co/d/9hGhPGP) $22/ea
* [Apex RC Products Lipo Battery Voltage Checker Alarm LED](https://www.amazon.com/PACK-Battery-Voltage-Checker-Alarm/dp/B00XQ91ECA/ref=sr_1_1_sspa?crid=3JFXU41YZHZUA&dib=eyJ2IjoiMSJ9.CS1ptEwPtlFX3SRPn5rRog_Ur_yVYeq7qLqW_5CB9t0Df_3Ldk_Iv-wJvT6aAhgtzDl6gJBEtQ-b5VrptfzcmAJMwH7WEvfZdThKjUsttJnD2GT8oaQYdlWwyGospvMfB5_ZHZU1KSSEk009kngqdNIsFVHSMUyu3TPkGKg-f5N3T_NaqY6vesy7BD9znLHan6Rnyy6s-qQ4ryUdpDOK-6MNcd1JmSYguaE-7dpOzps.PSHaWDX2zBwhW5PwC8IFTKsPJ4g0_BXWCAmOLae64lk&dib_tag=se&keywords=voltage+alarm+lipo&qid=1729715135&sprefix=voltage+alarm+lipo%2Caps%2C98&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1) $5/ea
* [D-Planet 5A DC-DC Adjustable Buck Converter](https://www.amazon.com/Adjustable-Converter-1-25-36v-Efficiency-Regulator/dp/B079N9BFZC?pd_rd_w=Bfxeh&content-id=amzn1.sym.15d5b68b-7dc9-4582-9d4e-256fb97eea2d&pf_rd_p=15d5b68b-7dc9-4582-9d4e-256fb97eea2d&pf_rd_r=TB49TBA8HEV554Y7KXKF&pd_rd_wg=0Hn5d&pd_rd_r=bb8f4b17-e5f6-4c76-9c82-ee794e403626&pd_rd_i=B079N9BFZC&psc=1&ref_=pd_bap_d_grid_rp_0_1_ec_bnp_bia_t) $4/ea
* [HiLetgo 12V 1 Channel Relay Module](https://www.amazon.com/HiLetgo-Channel-Isolation-Support-Trigger/dp/B00LW15D1M/ref=sr_1_1?crid=2L6UEN9MV89P5&dib=eyJ2IjoiMSJ9.ljfimG_lvi1zLxKbbqVrHKdDvjjqtHMTYQ6Di_AidsOXDwaNb5k6bQ6JnbYNLHrFCrG8wMzmtR7DCObanS7rJdoo3y5tVOgu7RhdrT5MWqMQE-zh29_1RUN9tqVvq_tV1K3H4OTaNeK9o8FcfMtln4APbpgxo1Sijs6dgbj6yrLHPzGvArxu3KxLVgL5-AAAONReyrc_6lm-973-knQw5rL4c77kQAVI5MS3iFbanUE.2tY7W1a8oDht1O7Nsa33Z9jsrCmpuyjO5lpw_mubj4w&dib_tag=se&keywords=relay+hiletgo+12v&qid=1729715275&sprefix=relay+hiletgo+12v%2Caps%2C101&sr=8-1) $6
* [ADS1115](https://www.digikey.com/en/products/detail/adafruit-industries-llc/1085/5761229?utm_adgroup=&utm_source=google&utm_medium=cpc&utm_campaign=PMax%20Shopping_Product_Low%20ROAS%20Categories&utm_term=&utm_content=&utm_id=go_cmp-20243063506_adg-_ad-__dev-c_ext-_prd-5761229_sig-Cj0KCQjwveK4BhD4ARIsAKy6pMJdbAgPg5I6A2r7JBqZIvvhlJ9T9aB8L3wfvTercu3b0CjaMmwQsJwaAiA0EALw_wcB&gad_source=1&gclid=Cj0KCQjwveK4BhD4ARIsAKy6pMJdbAgPg5I6A2r7JBqZIvvhlJ9T9aB8L3wfvTercu3b0CjaMmwQsJwaAiA0EALw_wcB) $15
* [BNO055](https://www.digikey.com/en/products/detail/adafruit-industries-llc/4646/12609996?utm_adgroup=&utm_source=google&utm_medium=cpc&utm_campaign=PMax%20Shopping_Product_Low%20ROAS%20Categories&utm_term=&utm_content=&utm_id=go_cmp-20243063506_adg-_ad-__dev-c_ext-_prd-12609996_sig-Cj0KCQjwveK4BhD4ARIsAKy6pMJz2LQOf2UJl3TehB7EVHKgmacy5MMnsN57dATvkpAkq1qRndiR6XMaAkDgEALw_wcB&gad_source=1&gclid=Cj0KCQjwveK4BhD4ARIsAKy6pMJz2LQOf2UJl3TehB7EVHKgmacy5MMnsN57dATvkpAkq1qRndiR6XMaAkDgEALw_wcB) $30
* [HDMI to microHDMI Cable](https://a.co/d/1LvKoJy) $11
* [LiPo Batter Charger](https://a.co/d/ekbKW0U) $30
* Vicon reflective markers
* *Assorted electrical equipment including*
  + [20 Pack of Male and Female 3.5mm Bullet Connectors](https://a.co/d/bLiBxva) $13
  + [Deans T connector](https://www.amazon.com/Pairs-Connector-Female-Silicon-Battery/dp/B07WHPD4KD/ref=sr_1_1_sspa?crid=MTSXID68185Y&dib=eyJ2IjoiMSJ9.DW6Ars3MGoYmUqNWcxUF45a9OHhlkF7uFgL1OvvhF-O8Gr6uVLsonEYDNOq0zRHt--wS8olSx0udRVrpWvCkuENMxP3BECGfSPPVthZ6XAL_CARyXQbEz082qgESYd4K5e0AjFfJaDStgLqn9GcQgE9qlwPZs_NxDjG0Is7jZlK0L5Tg42NRJOc95xJhzYd48JLl7RNgOCCtedGQQ4ysmqnJh4v6oPoXmt1UXw8poYXTevPHps1wHJo2BUu75IlDcv0u5NYIZzrIx5VQb3bIaChQChg_oeyZPL2CaSUzAW8.4mJB98sH9NH8htojVoSySrVzXl65U8UkmI7XaESLLMU&dib_tag=se&keywords=deans+t+connector&qid=1729715338&sprefix=deans+t+connector%2Caps%2C102&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1) $2/ea
  + Wires
  + Resistors (16.3kOhm and 10kOhm equivalents)
  + Wire crimp connectors
  + Heat shrink
  + Electrical tape
  + Soldering equipment
  + Voltmeter
* Sticky pads
* Zip ties
* Carabiners
* Weight
* Paracord
* Impact gloves
* Face shield

Full Wiring Diagram

A diagram of a computer

Description automatically generated

Bottom baseplate schematic

A drawing of a drone

Description automatically generated

Top plate schematic

A drawing of a circuit

Description automatically generated