



# AUTONOMOUS DRONE COURSE

Introducing the first autonomous drone course in Malaysia, where students can build and program their very own autonomous drone. A remote control aircraft becomes a drone when it is capable of autonomous flight, with no input from the pilot. Students will learn more about autonomous vehicles and be prepared for the future.



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# Course Outcome

- Students learn the vast differences between a remote control aircraft and an autonomous drone.
- Students understand the technology that allows an aircraft to become autonomous.
- Students learn to be more careful around autonomous vehicles, by understanding the potential risks behind them.
- Students obtain a higher level of understanding of PID controls.
- Students learn about problem-solving about autonomous vehicles.
- Students obtain a very highly sought-after skillset - autonomous vehicle technology.



# Items Required

1. Laptop
2. Internet connection
3. Here 3 GPS
4. Remote control T10
5. Battery
6. Charger
7. Pixhawk The Cube Orange Standard Set
8. Multicopter frame
9. Motors and ESC
10. Propellers
11. Allen key set
12. Zip ties
13. Soldering kit
14. Wire stripper



# Day 1

## Build and Solder the Frame (8 hours)

### 1. Introduce Multicopter

- How does a multicopter work?
- What's the difference between a Multicopter and a Drone?
- Multicopter Frame
- Autopilot firmware Ardupilot
- Ground control station Mission planner
- Build your own frame
- Standard hexacopter build by Alphaswift
- Safety
- Other vehicle types
- Real-world usage

### 2. Ardupilot hardware Pixhawk The Cube Orange

- Features
- Specs
- Ecosystem
- Where to buy - Alphaswift Shopee



# Day 2

# Autopilot Hardware and Software (8 hours)

## 3. Introduce various ground station software

- Install Mission Planner

## 4. Autopilot hardware assembly

- Standard orientation
- Sensors wiring
- Connect ESC and motors
- Install GPS and External Compass
- Caution: Vibration and Magnetic interference

## 5. Ardupilot firmware

- Upload firmware
- Testing firmware
- Troubleshooting

## 6. Settings and configuration

- Frame type
- Motor numbering check
- Radio Control (RC) calibration
- Accelerometer calibration
- Compass calibration
- RC flight mode setup
- Motor emergency kill switch
- ESC calibration
- Motor test and calibration
- Failsafe



# Day 3

# First Test Flight (8 hours)

## 7. Flight modes

- Recommended flight modes
- Pre-arm safety checks

## 8. Arm and Disarm

## 9. Tuning and Setting up the aircraft

- Preparation for the first flight

## 10. First flight

- Stabilize mode
- Altitude hold mode
- Low battery warning
- EKF warning
- Vibration warning (30m/s/s, 60m/s/s)
- Troubleshooting
- Evaluate the flight performance of aircraft

## 11. PID tuning

- PID basics
- Basic tuning
- Advanced tuning

## 12. Second flight

- Position hold mode
- Loiter mode
- Troubleshooting - Toilet bowl!

## 13. Flight Log review (Dataflash)

- SD card transfer
- USB cable transfer
- Tools to view log files
- Diagnosing problems using Logs
- Automatic analysis

## 14. Pre-flight checklist

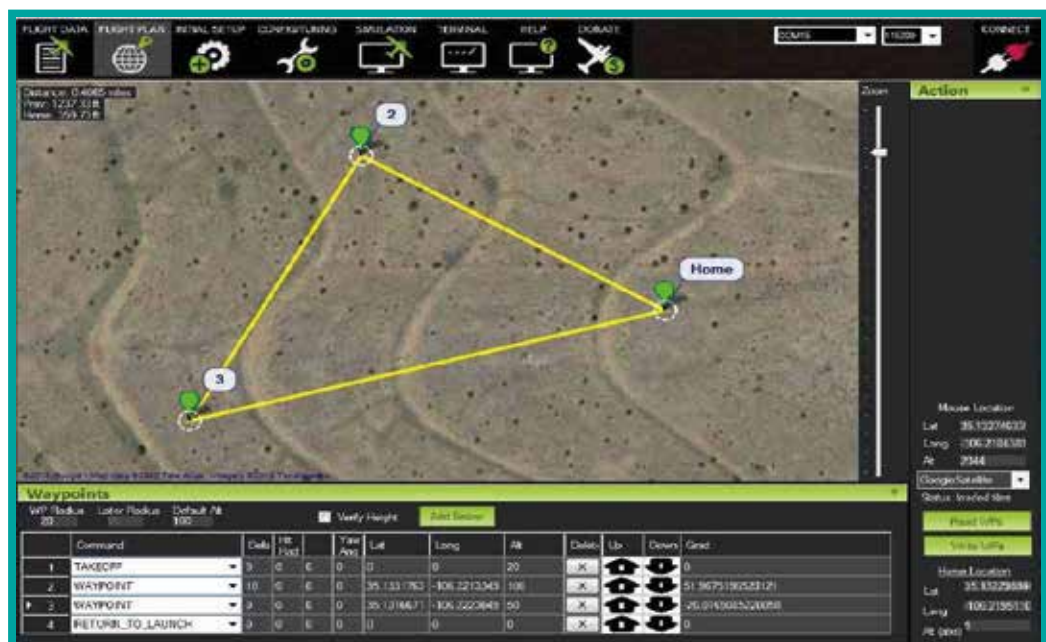


# Day 4

# Mission Planning Auto Mode (8 hours)

## 15. Mission planning

- Waypoints and events
- Command list
- Plot waypoints
- Pre mission flight performance check
- Loiter mode
- PSC in the log file
- First Auto mode flight
- Perform drone missions
- Monitoring the flight performance
- End



Waypoints	WP Radius	Loiter Radius	Default Alt	Verify Height	Exit System					
1 TAKEOFF	3	0	E 0	0	0	20	X	Up	Down	Grad
2 WAYPOINT	10	0	E 0	35.1337763	-106.2213043	100	X	Up	Down	31.967219028121
3 WAYPOINT	3	0	E 0	35.1318617	-106.2202943	50	X	Up	Down	35.014004520058
4 RETURN_TO_LAUNCH	3	0	E 0	0	0	0	X	Up	Down	0

# Contact Us

We hope that this handbook has been helpful, and if you have any questions, do drop us an email or a call. We wish you the best and we are very excited to have you on board!

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