

Introduction to Drones

ASSIGNMENT 1

EXPERIMENTAL STUDY OF CUSTOMIZED DRONE COMPONENTS INTERFACING.

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Aim : Experimental study of customized drone components interfacing.

Theory : Drones are commonly known as Unmanned Aerial Vehicles (UAV). A UAV is a flying thing without a human pilot on it. Here, by thing we mean the aircraft. For drones, there is the Unmanned Aircraft System (UAS), which allows you to Communicate with the physical drone and the controller on the ground. Drones are Usually controlled by a human pilot, but they can also be autonomously controlled by the system integrated on the drone itself. So what the UAS does is communicate between the UAS and UAV. Simply, the system that Communicates between the drone and the controller, which is done by the commands of a person from the ground control station, is known as the UAS. Drones are basically used for doing something where humans cannot go or carrying out a Mission that is impossible for humans. Drones are used Mainly by Military Men, scientific research, agriculture, surveillance, product delivery, aerial photography, recreations, traffic control, and of course, for terrorist attacks and etc.

Components :

1. Drone frames

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2. Motor
 3. Propellers
 4. Flight Controllers
 5. Electronic Speed Controllers (ESC)
 6. Battery management systems
 7. TRANSMITTER/ RECEIVER

The system consists of a KK2.1.5 Multi-rotor board, transmitter, receiver, Lipo battery, electronic speed controllers, motors, and frame.

Methodology:

Drone frames

Basically, the drone frame is the most important to build a drone. It helps to mount the motors, battery, and other parts on it. If you want to build a copter or a glide, you first need to decide what frame you will buy or build. For the gliding drone, the number of parts will vary. So, choosing a frame is important as the target of making the drone depends on the body of the drone. And a drone's body skeleton is the frame. Make sure you read the specification before buying the frames. While buying frames, always double check the motor mount and the other screw mountings. If you cannot mount your motors firmly, you will lose the stability of the drone in the air. You should also choose a material which is light but strong. My personal choice is carbon fiber. But if you want to save some money, you can buy strong plastic frames. When you buy the frame.

frame	Xshape
width	450mm
height	55mm
weight	280gm
Motor mounting holes	16



frame

Motor :

There are a few types of motors that are use to build drones. But as the drone needs to be thrust in the air to float, we should use some powerful motors. The cheap, lightweight, small, powerful motors and high speed and electronic control. used in drones are Brushless DC

motors (BLDC). For small drones, we do not use BLDC motors, but instead use small DC gear motors.

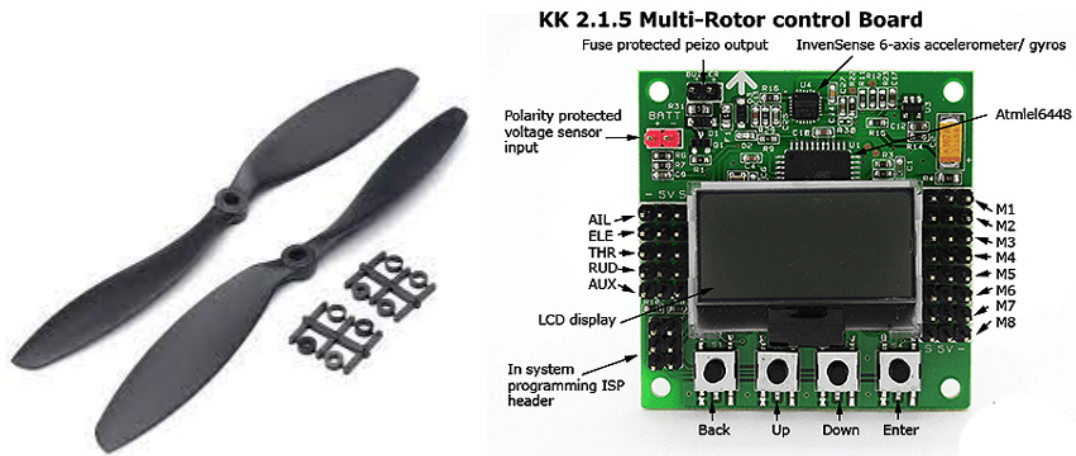
BLDC motor is a type of synchronous motor that is powered by DC source via an inverter to produce an AC electric current to drive each phase of the motor. Its construction is simple as permanent magnet synchronous motor.

kv(epm/v)	1400
Max.Power	920w
ESC	30A
Weight	150g
Battery	3s-5s LiPo

Propellers :

These are simply fans which convert the motion of the motor into upward thrust. They are, made up of flexible fiber to be unbreakable while crash landing. When you choose propellers for your drone, choose the lightest but strongest propellers. You also need to keep in mind that the propellers should be balanced on both sides. Most drone flight failure are due to a fault in the propellers. So choose carefully. Always choose the right size propellers. Follow the motor manuals to choose which size suits best.

inches	10 Inch
thickness	0.45 inch
Diameter	0.8 inch
Weight	22 gms
Type	Pusher & puller pair Type



Flight Controllers :

This is one of the most important things to control the drone from the ground.

- KK 2.1.5 is a board with ATMEL mega 664PA,8-bit AVR RISC based microcontroller with 64K of memory.
- It is easy for the beginner to start with and has firmware pre-defined in it.
- While activating or deactivating the board there is an audio warning from the piezo buzzer of KK 2.1.5.
- It is the most stable board because it has inbuilt gyroscope, 6050 MPU, and auto level function.

- This board has eight motor outputs, five control inputs, an LCD display, polarity protected voltage sensor input, an ISP header, six-axis accelerometer/gyroscope, a fuse protected piezo output.

Specifications of KK2.1.5 Board

Model	KK2.1.5
Input Voltage (V)	4.8V-6.0V
Firmware	Pre-installed firmware
Sensors	6050 MCU
Weight (gm)	26 gm
Signal to Esc	1520us
Processor	Atmel 644PA

Electronic Speed Controllers (ESC):

You cannot control the speed of motors of your drone unless you use speed controllers. They enable you to control the voltage and current of the motors and hence control the speed, which is the first priority to move the drone one place to another, after floating in the air. You need to increase and decrease the speed of motor(s) to move the drone forward, backward, left, or right.

Model	Simonk 30A
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Burst Current	40A For 10 sec
Constant Current	30A max 40A<10S
BEC	3AMP
Suitable Batteries	2-3s Lipo
Weight	23g
L*W*H	45*24*9



BATTERY :

A drone is useless without a battery. All motors, flight controllers, radio, and processing require power. But it is not a wise decision to use the heavy battery to fly your drone because most of the energy will be spent on the thrust of a drone to fly. So, we need to choose light but powerful batteries. In a drone, we usually use lithium polymer batteries. Choosing the right battery for the drone is one of the most critical things.

Before choosing batteries for your drone, keep the following things in mind:

- Battery size and weight
- Battery discharge rate
- Battery capacity
- Battery voltage
- Battery connectors

NO. of cells	3
Output Voltage	12.5v
Weight	400gm
mAH	5200mAH

TRANSMITTER/ RECEIVER :

The Transmitter acts as a controller from the user. It is a radio communicating wireless control system.

The signal from the transmitter is received by the receiver placed on the frame of Drone through the antenna in a receiver.



LANDING GEAR :

It is flexible fiber material used for landing.



Camera :



1. Model: FPV cameras
2. Image Sensor: 1/3CMOS SUPER HAD II
3. Signal System: PAL
4. S/N Ratio: > 60Db(AGC OFF)
5. Electronic Shutter Speed PAL: 1/50-100.000
6. Min illumination: 0.01Lux/1.2F
7. Auto Gain Control(AGC)
8. Backlight compensation(BLC)

Other Components :

- LiPo battery Charger
- 8* 1.2v Ni-Cd batteries
- Ni-Cd battery charger
- DuPont connectors
- Buzzer
- Zip tie
- Foam tape

Conclusion :

In this Assignment we have learned about components require to assemble the drone or quadcopter like Drone frames, Motor, Propellers, Flight Controllers, Electronic Speed Controllers (ESC), Battery management systems ,TRANSMITTER/ RECEIVER their specification why we require them. With the help of these components we can assemble drones.