

DIGI Drone

Exploring the Drone Technology

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Abstract— Drone unmanned Aerial Vehicle is expected to serve as aerial robotic vehicle to perform task on their automated system. Drone or more formally known as, unmanned aircraft system are poised to revolutionize to domestic aviation landscape, raising complex question in terms of air space safety. However, over the last decade's confluences of Integral rapid maturing technologies have a dramatic increase in the innovation and automation of unmanned aerial vehicle. Technological advances have reduced the cost and increase the performance. The goal of this project is to build, modify and improve an existing drone kit to obtain stable flight, gather and store global positioning system data and perform auto commands such as auto

– landing with “First Person View” drone technology, LED flight indicator, GPS module and micro SD card adaptor were interfaced with the drone kit. Currently the drone can properly stabilize itself, determine its GPS location and store the log data with these we will try to protect our drone from hackers and reduce the build cost with advance features of Drone like Physical strength, robustness, Light weight, Good Vibration Damping and High dimensional Stability.

Keywords— Flight Controller, Transmitter, Propellers, Gimbals, Brushless Motors, Battery

I. INTRODUCTION

What is drone? A drone is unmanned air craft's. Drones are more formally known as unmanned aerial Vehicle (UAVs) or unmanned air craft system. They are usually flying robots. Who flies Drones? Right now in U.S the drone are flies by Environmental Organizations, Universities, Law-Enforcement Agencies, Professional Aerial photographer, Hobbyists.

Drone is the fastest growing technology. This sector has is large growing sector. The fastest growing hobby drown companies are DJI, Parrot, 3D Robotics. Hobby Drone joins the internet of things. They use the embedded system to make Drone more compatible and compact.

The Drone market is expanding into the internet of things and wearable markets. The Drone future is immersive. They offer following-

- Epson Moverio Smart Glasses
Smart Glass integration for commercial drone pilots provided the feeling of sitting in the cockpit.

- Epiphany Smart Glasses
It monitors hand motions to control drones system with simple gestures.
- Thalamic Labs Myo Armband
The Myo Gestures and motion control armband recognizes hand gestures to control drones.
- Metalized Eyelashes
Blinking on an eye wearer with metalized eyelashes can create a network through which we could be use to power a motor in a drone.

In U.K there is use of drone for filming, which tremendous increase in last few years. In year 2014, 80% increase in granting permit for flying drones in

U.K. This included a number of film maker and police forces. There may be even larger in features that drone flown over and above larger, a region whose globe worth for \$150 billion. There is certain legal obligation by CAA to use Drones for filming are as follows-

- The numbers of Drones licensed for commercial flights by the nations Civil Aviation Authority (CAA), shoot up – from 30 in January 2013 to more than 500 today.
- The Drone that weight more than 20kg are currently banned from flying in civilian airspace other than in a large zone in *West Wales* and a smaller one over the military base at *Boscombe Down*.
- If fitted with camera, a Drone must be flown at least 50m distance away from people, vehicle, buildings and structure which are not under the pilot's control.
- Unmanned Aerial Vehicles should make 150m distance from a person or building and also it should be within line of sight which is 500m horizontally and 400ft (122m) vertically.

Drone has a wide application today, but in early days they were mostly used for military services. Drone is in practice since 1960; drone technology is continuously emerging as new innovation and big investment is looking to bring more advanced Drones to the market every time. The first use of Drone was for retooling of the de Havilland DH82B known as “Queen Bee Biplane”. An unmanned aerial vehicle i.e. Drone are made up of light

weight composite materials to reduce the weight of chassis which will increase the reliability and stability of Drone when it is on board. The composite material are light in weight, they allows drone to stretch for high altitudes with reliable featuring technology.

Recently Disney applied for patents to deploy drones in its theme-park shows, proposing using swarms of drones for light displays and sending them into the air as floating movie screens.

II. EASE OF USE

Drones are the hottest consumer product of the market, due to increase of technical features. Today drones are liked by every nation and state. Every other nation is showcasing their best drone technology for their army. This show casing of drone also shows the technical power of country.

The Big Business of consumer Drones from wearable computers to autonomous Drones. How we experiences the world is changing fast!! The Drone economy is poised for explosive and innovative growth. The market rate in 2013 was \$11.3 billion and approximated to be \$140 billion in 2020.

Rise of machines of Unmanned Aerial Systems is 56% by United States, 12% by China, 9% by Israel, 8% by Russia, 3% by Pan-European, 2%-2%- 2% by Britain-France-Italy and 6% by other Nations. As the technology has matured and become more main stream, a number of practical and very interesting uses of drone technology have emerged. Every day the drone technology is emerging, with this emerging technology applications are also increasing tremendously. There is tremendous innovation in this field. The ecommerce business are

looking towards this technology very straight forwardly, as they knew once the system become completely stable it will save time for delivering the products in mean time. Besides this, various automated industries are adopting the drone technology for Telecommunication firms, Royal mail delivery drones, drones for farming, police drone, NASA to work with UK for drone traffic system, companies using drones for network rail, army, etc. Thus application is increasing with the increase of technology. The industries, people are adopting this revolution. Soon the Drone will have robotics features, since they are available with latest and innovational embedded system, they were already known as flying robots now they will pose the features of robot too. Now they will be exactly know by their features as flying robots.

III. DRONE DANGER

Drones are in dangers because Drones are robots, they are susceptible to hackers, the Hackers used a form of spoofing device to help to change the drones path steer it to a location of their choice, thus drones are susceptible to Hackers, Viruses and Hijacking. There is always a big risk of crash when drone collide with air craft's. US Air Flight 1549 crashed just from hitting a bird. Police drones are also crashed which are usually of light weight.

IV. HOW DOES DRONE WORK?

The Open Source community is making all possible efforts to satisfy all makers and pilots, who are irritated with latest edge of technology. Once again they have achieved their goal and this time with Drones. Here is an insight view into how to make your own unmanned Aerial vehicle.

HOW DOES A DRONE WORK?

- The each and every motor mounted to Drone spins in an opposite direction to other two motors beside it.
- Altitude is controlled by accelerating or decelerating all the motors at the same time.
- Drone is mounted with on-board controller (flight controller) for a reliable and stable flight.
- The flight controller collects data from control board to maintain a precision estimate of its orientation and position.
- The pilot gives the Drones' flight instruction.

Normally, the more the vehicle tilts, the fastest it travels.

- The Smartphone trendy featuring apps are also used to monitor the drone and control it with GPS and Wi-Fi system.

WHAT NEED TO BUILD A DRONE?

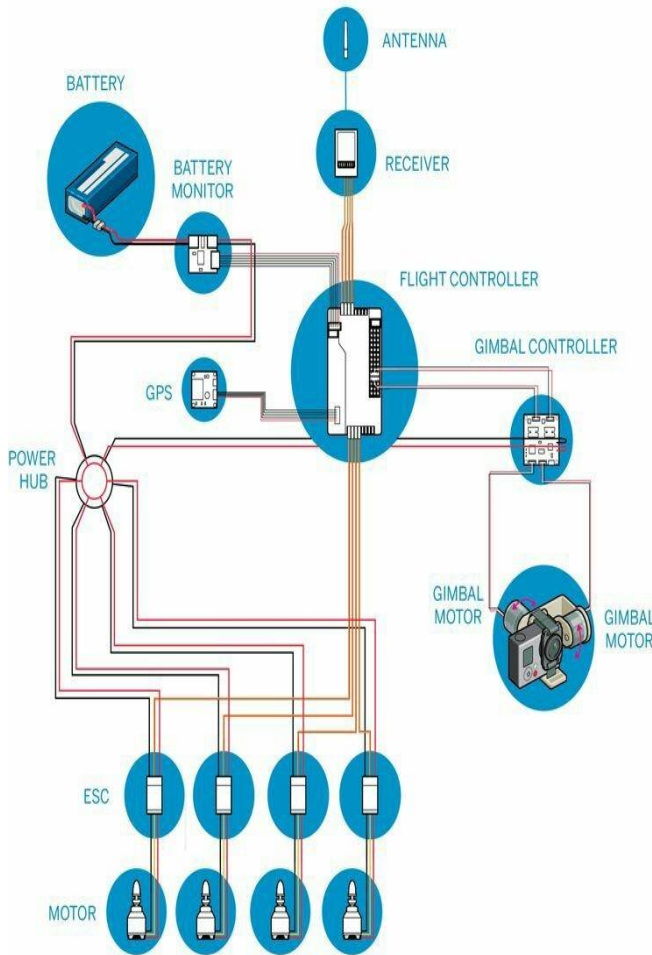


Fig 1. Drone Circuit Diagram

A. Propellers

This generates the downward thrust that makes it possible to lift, sustain and move the multi-blade.

B. DC Brushless Motors

The most common is the brushless type, which doesn't use brushes to change the polarity of the blade.

C. Chassis

The Chassis (frame) is the main structures of the drone where all the components are the housed.

D. Control board

A conventional fixed-wing aircraft flight control system consists of flight control surfaces, the respective cockpit controls, connecting linkages, and the necessary operating mechanisms to control an aircraft's direction in flight. Aircraft controllers are considered for controlling the on board flight when it changes it changes its current speed. Flight Controller is an automated element of Drone that synchronizes every other part of Unmanned Aerial Vehicle to make sure that it functions properly.

IMU controllers

An inertial measurement unit (IMU) is an electronic device that calibrates and gives reports on force experiences by the drone using gyro meters and accelerometers. It measures the current rate to which it will accelerate for each and every step.

E. Gimbals Control

Gimbals are something that holds a camera during a flight and allows it to deliver footage. Gimbals give features to broadcast the footage to ground monitor.

F. Drone with sensors

Drones are now used with sensors, to provide 3D model of the building and landscape. Sensor and Radar are used to sense the obstacles and helps the drone to fly in safe mode.

G. Electronic Speed Control (ESC)

An electronic speed control or ESC is an electronic circuit with the purpose to vary a servo- motor's speed, its direction and possibly also to act as a dynamic brake. Electronic Speed Controller is mostly mounted on the motors to supply a three phase electric power with low consumption of input voltage on motors.

H. Ground Station

This is the remote control for the drone and is responsible for maintaining wireless bilateral communication between the pilots and the drones.

I. Battery

A lithium polymer (LiPo) battery gives a great collision of energy, power density and long lifespan on the markets. Lipo battery ensures high energy density, a small size and a good discharge rate.

V. EMBEDDED SYSTEM OF DRONES

Embedded Intelligences is not just for Smartphone's, now with explosive and innovative growth in Drone technology, the Drone has made their position in Embedded System. Drones are now available with different skill depending upon their uses and application, the embedded system are installed.

A. Wi-Fi

Wi-Fi embedded drone are entirely controlled via Wi-Fi. This embedded system gives drone to fly safely in the sky with total control of pilot on Drone.

B. Pressure Sensors

A barometer which measures aerial vehicle altitudes using pressure is known as pressure sensors. These *pressure sensors* are so sensitive that they can detect the change in air pressure when your Drone moves a few centimeters. A barometer pressure sensor is fixed under a sheet of flip32+flight controller board.

C. Ultrasonic Altimeter

Ultrasonic Altimeters helps with vertical stabilization of Drone.

D. Accelerometers

Accelerometers help with orientation for flight stabilization.

E. Gyroscopes

Gyrostabilizer precision motion is a naturally occurring response. Gyro-scope i.e. the naturally-occurring precision using this gyroscope precision synonyms that stabilizing torque of naturally-occurring precision exactly synchronous with rod of that vessel. It quick, slow or random motion doesn't matter.

GPS Ready to Fly Mode

When compass is calibrated, the drone then scans the GPS satellites. When it achieves a stable satellite signal it allows the drone to fly in "Ready to Fly" mode.

F. On-screen Real-Time Flight Parameter

This system keeps a watch on on-time drone path and allows the pilot to control and monitor it. The pilot will be able to see the live broadcast of drone on monitor

G. First Person View (FPV)

"Airborne FPV is type of remote-control (RC) flying that has grown in popularity in recent years. It involves mounting a small video camera and analogue video transmitter to an RC aircraft and flying by means of a live video down-link, commonly displayed on video goggles or a portable monitor".

H. Radar Positioning/ Return Home

Enhanced radar positioning is a proposal for a position fixing system in Mari time navigation, based on radar navigation. It is automated process of determining the position of Drone.

I. No-Fly Zone

Drone maker wants you to fly their drone safely, which is why they just updated their GEO geofencing tech to keep you away from nuclear power plants, prisons, "national security events", wildfires and more. "Drone pilot want to fly safely and our GEO system helps customers to fly responsibly.

J. Smart phone Apps

Smartphone apps are developed to control the drone via smart phone. These apps are easily available at app store. Controlling Drones via smart phone are easy and simple. Using smart phone app you can monitor your smart sitting at your comfort zone.

VI. DRONE TECHNOLOGY

- The U.S Military has been using drone for intelligence since the Vietnam War
- Police drone are smaller and lighter and getting cheaper all the time
- The FAA estimates 7500 Drones will fly in the U>S airspace by 2018 and 10,000 by 2020.
- More than 150 types of Drones are being developed for domestic use.
- The Drone industry is expected to be worth \$6 billion annually within the next few years.
- Drones manufacturing and operation could create 100,000 new jobs within 10-15 years.
- Drone Surveillance is inexpensive can be used for
 - a) Search & Rescue
 - b) Tracking Criminals
 - c) Disaster Relief
 - d) Border Protection
 - e) Drug Enforcement
 - f) Time-Sensitive Missions such as hostage situations

□ Drone Politics up in the AIR

The 4th Amendment Protects American from "Unreasonable Searches or Seizures".

The issue – Drone technology is developing faster than legislation can be written to regulate it.

- 33 States introduced drone privacy laws in 2013.

CONCLUSION

The increase usage of Drone technology in today's life is quiet innovative. The drone has several benefits, with that it is dangerous too. It can be hacked, used for bombing, spying on someone. Despite the many advantage of drone there is still some concern with respect to security and privacy risk. Thus we need to overcome these obstacles to fly drone safely and happily on flight board.

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