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Unmanned Aerial Vehicle (DRONE)

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Abstract-- **The research work on this paper aims to develop an unmanned aerial vehicle equipped with modern technologies various civil military applications. It is an automatic system The shrinking size and increasing capabilities of microelectr-onic devices in recent years has opened up the doors to more capable autopilot and pushed for more real time UAVs applications. The Unmanned Aerial Vehicle (UAV) market is to grow dramatically by 2020, as military, civil and comercial applications continue to develop. Potential changes in air traffic management include the creation of an information It defines a UAV to be "An aircraft which is management system to exchange information among Air Traffic Management users and providers, the introduction of navigation, and the development of alternative separation procedures. The impact of each scenario on the future air traffic and surveillance is summarized, and associated issues identified. The paper concludes by describing the need for a UAV roadmap to the future. This paper aims to provide a simple and low-cost solution of an autonomous aerial surveyor which can do aerial surveillance ,recognize and track various objects, able in making simple 3d map .**

Keywords-– **UAV, Navigation**

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1.INTRODUCTION

To distinguish UAVs from missiles, a UAV is defined as a "powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or non-lethal payload‖ Therefore, cruise missiles are not considered UAVs because, like many other guided missiles, the vehicle itself is a weapon that is not reused, though it is also unmanned and in some cases remotely guided The term UAV is representative of a class of air vehicles known by different names: uninhabited aerial vehicle, unmanned aerial vehicle, remotely operated aircraft (ROA). The use of UAVs (Unmanned Aerial Vehicle) in geometrics and photogrammetric was increased rapidly in the last few years as well as the development of mathematical algorithm and sensors to achieve the more and more precise navigation and stabilization of UAVs. As we can see the slowly increasing tendency of the open source software in the field of GIS, we can find a similar

tendency in development of UAVs control system. The goal of this paper is to present a brief overview about the available open-source control system to describe the building of an UAV, based on one of these system and the first result of a field test, which was carried out with this low cost system.

2. MOTIVATION

Many military strategies and theorist have concluded, based on recent history ,the nature of future wars will be limited to regional and intra-state conflicts. Large interstate conflicts such as World Wars One and Two and the Persian Gulf War are not likely to be the wars of the future. Operations such as DESERT STORM and DESERT.

3. BLOCK DIAGRAM OF UAV

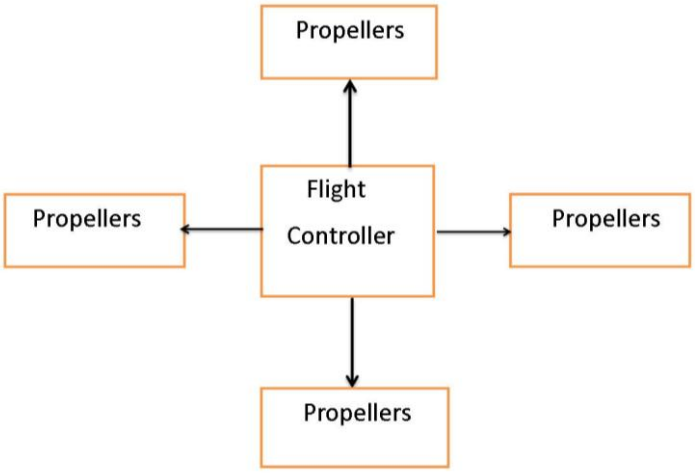

fig1. Block diagram of UAV

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4. STRUCTURE

The common properties of these systems are the freely distributed and modifiable software and hardware and the self- established community around them. The developing process can be really fast in this way, because in some cases (e.g. bad weather conditions for flying) the testing of a new feature is not possible by the programmer but other people

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can install this feature, test it in real conditions and give feedback to the programmer.
It contains following component-

5. DESCRIPTION OF BLOCK DIAGRAM AND COMPONENTS

I. Brushless DC Motor

In order to make the operation more reliable, more efficient, and less noisy the recent trend has been to use brushless D.C (BLDC) motors. They are also lighter compared to brushed motors with the same power output. This article gives an illustrative introduction on the working of BLDC motors. Brushless DC electric motor (BLDC motors, BL motors) also known as current, does not imply a sinusoidal waveform, but rather a bi-directional current with no restriction on waveform. Additional sensors and electronics control the inverter output amplitude and waveform (and therefore percent electronically commutated motors (ECMs, EC motors) are synchronous motors that are powered by a DC electric source via an integrated inverter/ switching power supply, which produces an AC electric signal to drive the motor. In this context, AC, alternating of DC bus usage /efficiency) and frequency (i.e. rotor speed).

S.No.	Component	Quantity	Specification
1.	Brushless DC Motors	4	1000 KV Rating
2.	Electronic Speed Controller (ESCs)	4	12 A with 1A BEC
3.	Propellers	4	8″x4.5″
4.	Battery	1	11.1 V, 2800 mAh
5.	Power Distribution Board	1	____
6.	Flight Controller	1	Atmega32 Microcontroller
7.	Flight Sensors	1 each	Gyrometer, Accelerometer
8.	4-Channel Transceiver	1	2.4 GHz Channel
9.	VGA Camera and SD Card	1	____

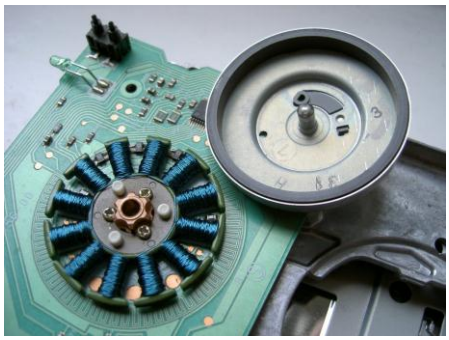

fig2. Brushless DC Motor

II. Electronic Speed Controller

An electronic speed control or ESC is an electronic circuit with the purpose to vary an electric motor's speed, its direction and possibly also to act as a dynamic brake. ESCs are often used on electrically powered radio controlled models, with the variety most often used for brushless motors essentially providing an electronically generated three-phase electric power low voltage source of energy for the motor.

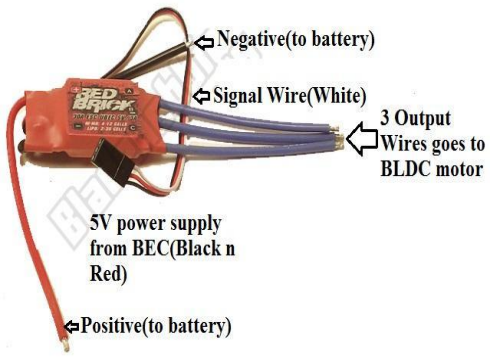

fig3. Electronic Speed Controller

III. Propellers

Propeller is a type of fan that transmits power by converting rotational motion into thrust. A pressure difference is produced between the forward and rear surfaces of the airfoil-shaped blade, and a fluid (such as air or water) is accelerated behind the blade.

fig4. Propellers

IV. Battery

An electric battery is a device consisting of two or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell has a positive terminal, or cathode, and a negative terminal, or anode. The terminal marked positive is at a higher electrical potential energy than is the terminal marked negative. The terminal marked positive is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device. When a battery is connected to an external circuit, Electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate

terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work. Although the term battery technically means a device with multiple cells, single cells are also popularly called batteries

V. Power Distribution Board

A distribution board (also known as panel board or breaker panel) is a component of an electricity supply system which divides an electrical power feed into subsidiary circuits, while providing a protective fuse or circuit breaker for each circuit in a common enclosure. Normally, a main switch, and in recent boards, one or more residual-current devices (RCD) or residual current breakers with overcurrent protection (RCBO), are also incorporated.

fig5. Power Distribution Board

VI. Flight Controller

The most important component of a multi rotor is its flight controller board. Flight control board has IMU sensors with a microcontroller to perform control task. Now what does it control?

A UAV needs to be stable on 3 axis i.e. pitch, roll and yaw axis so it can hover in midair. The IMU sensors sense the orientation of the aircraft and send the data to micro-controller, microcontroller processes the raw data to estimate the angles and provides error compensation to bring back aircraft to its initial position.
And it does this with amazing speed and accuracy that's why we need a controller for UAVs. UAVs can run both on AVR as well as Arduino based systems. For our drone, we'll be using AVR based ATmega 32 micro-controller.

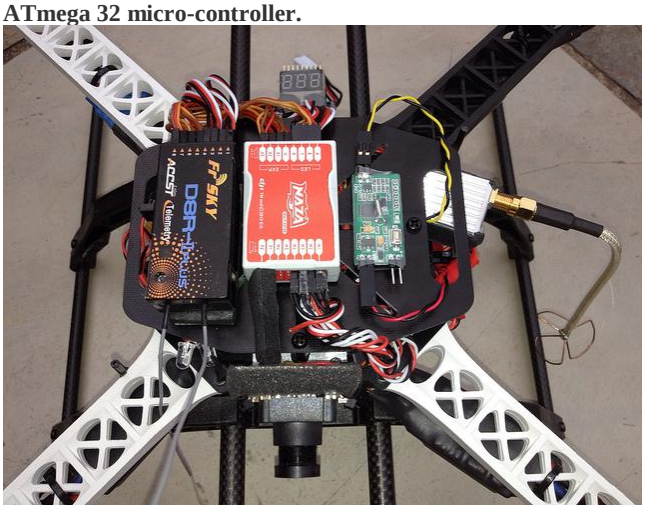

fig6. Flight Controller

VII. Flight Sensors

There are two types of flying sensors are being used in our project viz., accelerometer and gyrometer.
Accelerometer:- **An accelerometer is an electromechanical device for measuring the acceleration of a moving body. The device measures acceleration force. These forces may be static or dynamic.**
By measuring the amount of static acceleration due to gravity, you can find out the angle. The device is tilted with respect to the earth. By sensing the amount of dynamic acceleration you can analyze the way the device is moving.
Gyrometer:- **A gyrometer is a device that uses earth's gravity to help determine orientation. Its design consists of a freely rotating disk called a rotor, mounted on to a spinning axis in the center of a larger and more stable wheel. As the axis turns, the rotor remains stationary to indicate the central gravitational pull, and thus, which way is "down".**

VIII. 4-Channel Transceiver

The communication between the drone and its user is completely dependent on the transceiver. A corresponding receiver will be connected to the flight controller. The communication between the receiver and the RF transceiver is initiated by the transmitter section. The device uses ISM band spectrum (2.4 GHz) for communication. 2.4 GHz transmitter - receiver pair uses spread spectrum technique which makes it resistant to interference and gives glitch free operation.
Each channel allows one individual thing on the drone to be controlled. For example, one channel for throttle, one channel for turning right and left, one channel for pitching forward and backward, one for rolling left and right. Four channels is a minimum for a drone (pitch, roll, throttle and yaw).

IX.VGA Camera and SD Card

VGA Camera: - **The VGA camera is used to capture the image of the area in which the surveillance is to be done. VGA size is 640 pixels wide by 480 pixels tall (or vice-versa in portrait orientation). VGA is larger than CIF, QCIF, and QVGA, but smaller than 1 megapixel. (VGA is equivalent to 0.3 megapixels). For still photos, VGA is relatively small and low-resolution. For video, VGA is equivalent to standard-definition television.**
SD Card: - **Secure Digital (SD) is a non-volatile memory card format developed by the SD Card Association (SDA) for use in portable devices. The standard was introduced in August 1999 as an improvement over Multi Media Cards (MMC), and has become the de facto industry standard.**

6. WORKING OF DRONE

A typical unmanned aircraft is made of light composite materials to reduce weight and increase manoeuvrability. This composite material strength allows military drones to cruise at extremely high altitudes. Drones are equipped with different state of the art technology such as infra-red cameras (military UAV), GPS and laser (military UAV). Drones can be controlled by remote control system or a ground cockpit. Drones come in a wide variety of sizes, with the large drone mostly used for military purposes such as the Predator drone, other smaller drones which can be launched by hand, to other unmanned aircraft which require short runways. An unmanned aerial vehicle system has two parts, the drone itself and the control system.

The nose of the unmanned aerial vehicle is where all the sensors and navigational systems are present. The rest of the body is

complete innovation since there is no loss for space to accommodate humans and also light weight. The engineering materials used to build the drone are highly complex composites which can absorb vibration which decreases the noise produced.

7. OUTPUT OF THIS PROJECT

We can see from this above diagram that this work in any type of environment without taking too much time and also without creating noise .it can work in night and day both. And there is no use of any pilot in it also. That's why it is also known as Unmanned Aerial Vehicle.

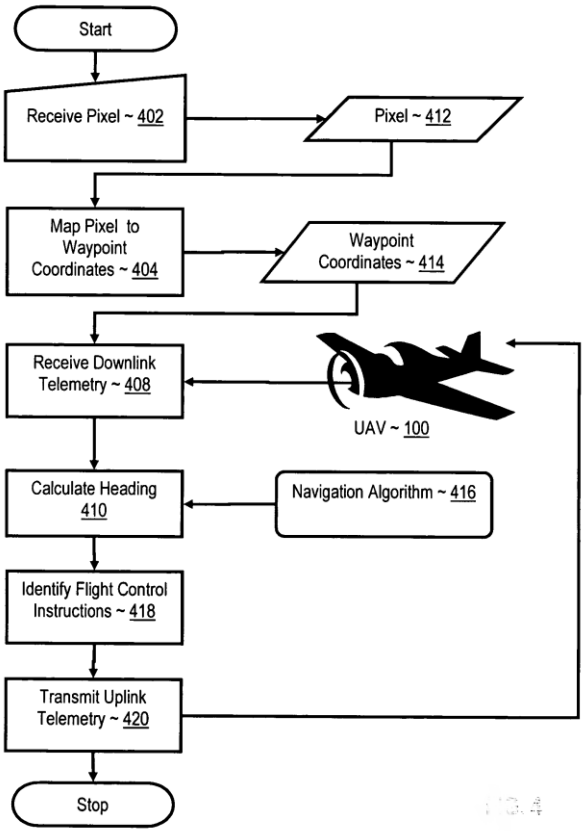

fig6. Algorithm of Drone

8. CONCLUSION

To ensure operational safety, technological innovations must enable a UAS's operator to detect other aircraft to avoid midair collisions within the current and next generation air traffic control systems. The lack of standard training procedures requires regulatory attention to guarantee operators are competent and international regulations must be uniform to encourage UAS expansion.

To guarantee the security of unmanned aerial systems, exploitable weaknesses in civilian GPS technology and operational frequencies must be eliminated through the introduction of new or existing technologies in the most cost-effective manner.

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