DRONE AS FIRE EXTINGUISHER

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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 microelectronic 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 commercial 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.

I. INTRODUCTION

Currently, there is a lack of unmanned aerial vehicles that are being used with the purpose of extinguish a fire or help prevent one. An unmanned aerial vehicle (UAV) is an aircraft without a human pilot on board. Its flight can be controlled autonomously by computers in the vehicle, or by remote control under the direct command of a human. In the United States and the rest of the world, most of the UAVs in existence are being used for the defence purpose. Fires that occur in homes and nonresidential buildings as well as fires in wild lands cause plenty of health issues; including death to humans and animals, in addition to great economic losses in structures, equipment and vegetation. Furthermore, the first response teams, such as firefighters, are exposing their lives to great risks in order to extinguish a fire. In addition to those huge problems, there is another one that does not cause so many struggles, but it does have a negative effect when a fire occurs. One of the most popular ways to extinguish fires is to spray water in the area affected by the flames. The water can be delivered via hose using a pressurized fire hydrant, fire sprinkler system, pumped from water sources, such as lakes, rivers or tanker trucks, or dropped from aircrafts in the case of wild land fires.

II. BLOCK DIAGRAM OF UAV

Transmitter:

Receiver:
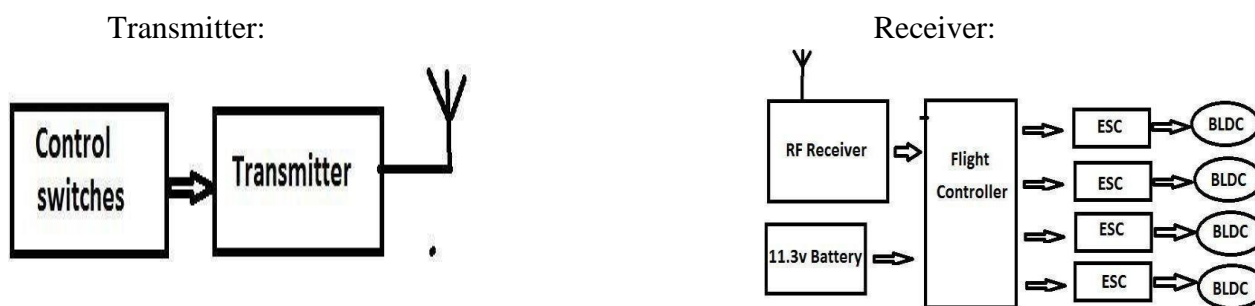
Fire Extinguisher:
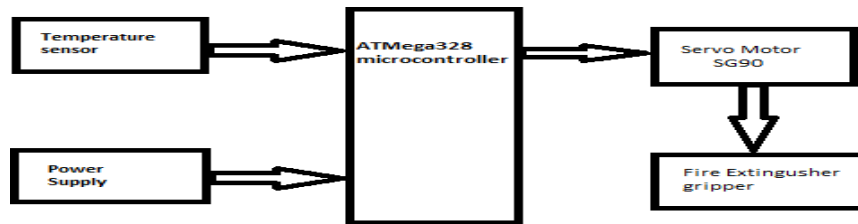
III. HARDWARE

1) 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.

2) Propeller
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.

3) 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 motors. They are also lighter compared to brushed motors with the same power output..

4) 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. Here we need 11.3v 2200mAH LIPO battery which is light in weight.

5) 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.

6) 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.

7) 6 Channel Transmitter and Receiver:
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.

8) ATMega 328 Microcontroller:

ATMega328 is an microcontroller chip in which the code is dumbed by using Arduino UNO development board. Here we are used ATMega 328 chip to code for fire detection the temperature sensor will work as fire sensor with logic and if fire is detected by the circuit then the grabber servo will get in action and release the extinguisher packet in fire acquired area.

9) Temperature Sensor:

Here we are using ds18b20 temperature sensor which has high range of temperature sensing and long life time. It is manufactured by Dallas company . it is available in two packages one is TO92 package and another is RTD package so RTD package has high range of sensing and life so here we are using RTD package of ds18b20.

10) Servo Motor:

Servo motor is used for releasing the fire extinguisher packets from drone over fire acquired region. Here Servo motor SG90 is used.

IV. SOFTWARE :

1) PCB Artist :

For designing the extinguisher we need a temp sensor , Atmega 328 chip and Servo has to be mounted over a board so we need an pcb designing tool by which we can mount Atmega 328 chip and sensor properly over a board. Here pcb artist software is used to design a pcb layout.

It is an open source software anyone can easily download and use it easily.

2) T6 Config:

T6 Config is the computer software which is used to program the 6 channel transmitter. By using this software we can change the controls of transmitter and based on that the motors are connected with receiver.

3) Arduino IDE:

To code the atmega328 chip we need development board as well as development tool so we are using Arduino UNO as development board and Arduino IDE as development tool. In Arduino IDE we can code by using embedded C language and can also check the functioning of coded chip using Arduino UNO board. \

V. APPLICATIONS OF DRONE:

1) Drone are sent to fire locations as scouts, using cameras with thermal imaging technology to help first responders in their rescue efforts. It can be equipped with thermal cameras to see in the low light-dark conditions, detect irregularities on various infrastructure.
2) For instance, drones have been used for other applications in order to assist sudden cardiac arrests, an ambulance drone carrying a defibrillators and instructions of different first aid procedures is now in use.
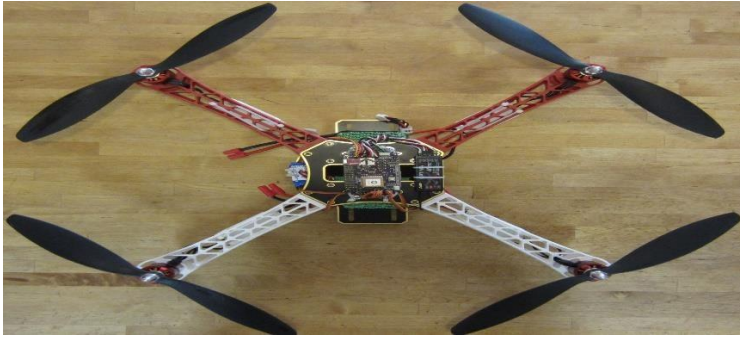
VI. ADVANTAGES OF DRONES:

1) Doesn't require a qualified pilot.
2) Can enter any environments.
3) Can stay in the air for up to 30 hours.
4) Can be programmed to complete the .mission autonomously.

VII. DISADVANTAGES OF DRONES:

1) Costly compared to manned vehicles.
2) Limited abilities.

VIII.   RESULT:

X.   FUTURE WORK:

For larger fires, it's possible that multiple drones would need to operate together, share data, respond collectively to stimuli, avoid obstacles and other dangers, and make instant decisions. Last week, a group of European researchers published research in the Science Robotics journal that demonstrated that large flocks of autonomous drones could seamlessly navigate is confined space. The research, highlighted here, demonstrated that aerial outdoor systems could exhibit flocking behaviors, similar to birds, that avoid collisions with other drones and objects without needing a central control. While the researchers didn't state this, one such application of this technology would include firefighting drones, among other use cases.

XI.   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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