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HIGH SPEEDEMERGENCY AERIAL VEHICLE

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Abstract— ***several thousands of people die day to day due to the time lag taken by the Ambulance service to reach the accident spot. This happens due to traffic jam, congestion in the city.***

A prototype of an emergency flying air ambulance (or) an ambulance drone which can reach the fatal cases faster than a normal ambulance which saves time is designed and it also measures the different health parameters using its measuring devices. When a phone call is given to the emergency number, the emergency operator tracks the location and navigate using global positioning system (GPS). The ambulance drone enters the scene in the instant time and real time commands are provided by the operator. The drone consist of a mini patient monitoring system which comprises of variant sensors which can be conveniently attached to the victim body and the important parameters is measured and it is immediately sent to the ambulance as well as to the nearby hospital using global positioning system and ZIGBEE. The particular result helps the paramedics as well as the doctors to evaluate the situation quicker with better diagnostic and therapeutic choices. Therefore, the goal is to develop an all-purpose medical tool kit that can be flawn to any crisis situation and it is used to give the actual time situation results to the ambulance and the hospital team so that they will be ready to serve to the needs of the patients. This prototype helps to support the routine ambulance rather than replacing the normal ambulance.

I. INTRODUCTION

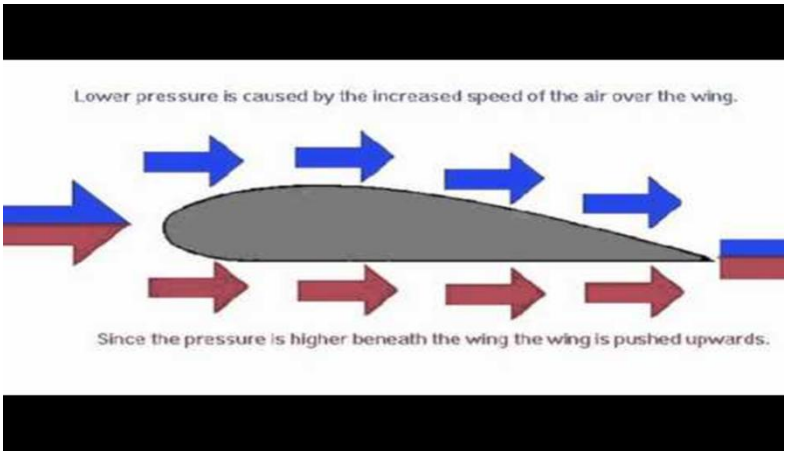
In today's world, there is a lot of traffic on roads which leads to congestion in the whole city. So in the time of emergency crisis situation, an ambulance which travels via road may not be able to reach the destination in time and the patient might lose his or her life. Thus, it is necessary to introduce a distinct means that would take the objective of „saving human life" one step closer. The first minutes of an accident are critical and essential to provide the right care to prevent escalation. Speeding of emergency response can prevent deaths and accelerate recovery dramatically. We prefer drones that which saves the human life in short time. This is the lifesaving technology can capable to deal with heart failures, drowning, traumas, respiratory issues and basic first aids.

II. PRINCIPLE OF DRONE

Quad copter is a device with an intense mixture of electronics, mechanical and mainly on principle of avaiation.The rotation of motor changes as per the transmitter signal send to form the four channel transmitter. The signal goes to the ESC which is turn controllers the speed of the motor the program for which is written in ATMEGA16chip.

III. AERODYNAMIC PRINCIPLE

The basic aerodynamic principles may vary for different types of UAV's. The quad-copters and hexa-copters are based on the principle of newton's laws while the air crafts are based on the bernoloullie's principle.



IV. DRONE CALIBRATION

Drones has a lot of sensors working on to maintain flight efficiency, such as gyro, accelerometer, barometer, magnetometer, etc. You got to make sure these sensors have accurate measurements to fly safely.

These sensors can, through vibration, aging, impact, drift in their response over time and thus there will be a change in their original values overtime, which we called as error. Calibration of the sensors will remove these errors so that the drone can avoid crash, malfunction, etc. Calibrating a drone or a controller is the process of setting or correcting errors which caused inaccurate sensor measurements. It check adjust or determine by comparison with a standard model and to make corrections accurately.

Calibration compass

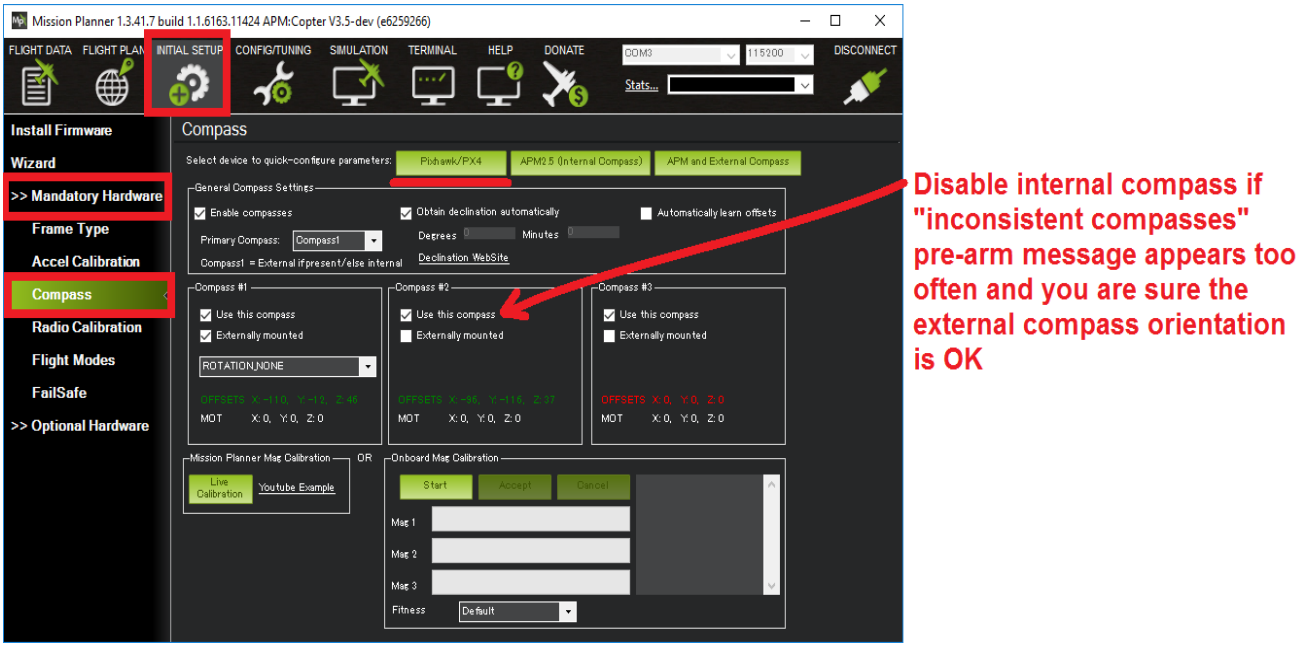
Compass which is also known as magnetometer, gives the sense of direction to the drone. The data of magnetic field in the area is processed in the microcontroller to give heading angle with respect to magnetic north. The compass, guides the drone between cardinal directions as it flies over a field. Since the earth's magnetic field changes depending on where you are, if you move your drone a large distance (several hundred miles) this cause the drone to misread its heading and fly a few degrees off its true centre, which will decrease flight efficiency.

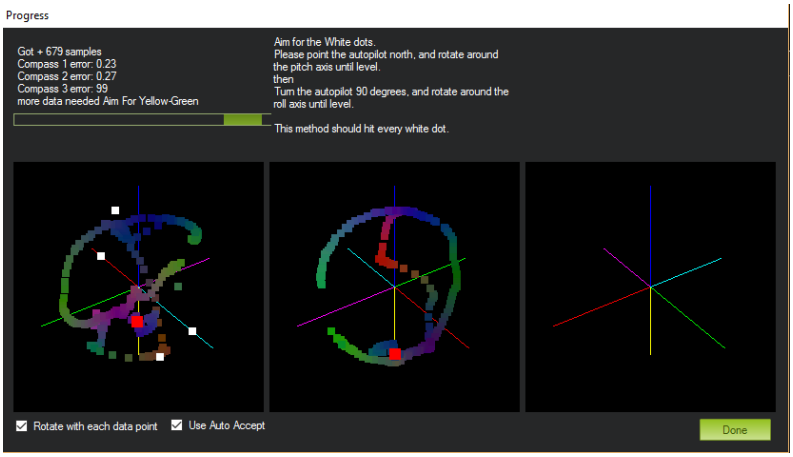
IMU Calibration

Thus an IMU, or inertial measurement unit, is an electronic device that measures and process the data collected from all the sensors above, which in turn gives us data about the drone's specific force, angular velocity, altitude, etc.

IMU calibration on a level surface updates a combination of values, the flight controller software uses as a reference for a level stationary hover. From there the craft responds according to flight commands.

If the craft has accurate data of what actual surface level is, then it can balance itself with respect to that levelled value and will hover nicely and stably above the surface. This will also help the drone to make accurate turns, ascend and descend, etc. with respect to our commands. Bad IMU calibration could cause drift and attitude issues as the flight controller fights to hold the craft in what it thinks is the correct attitude as opposed to the correct physical attitude..



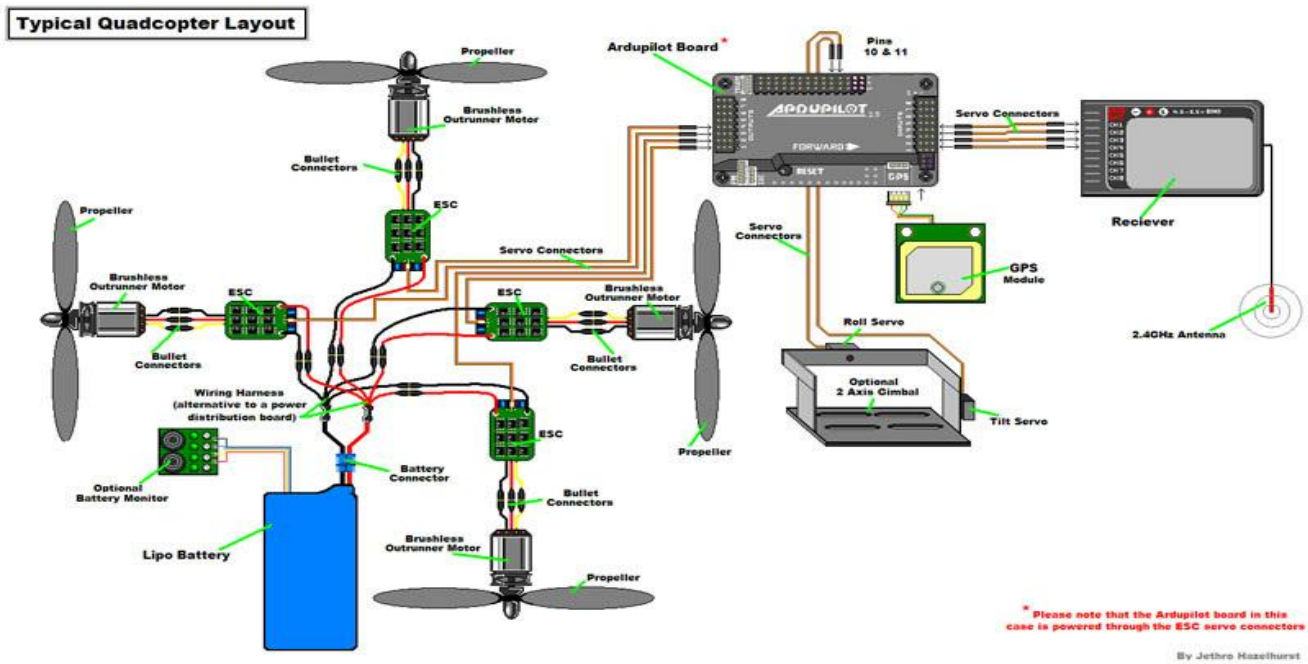


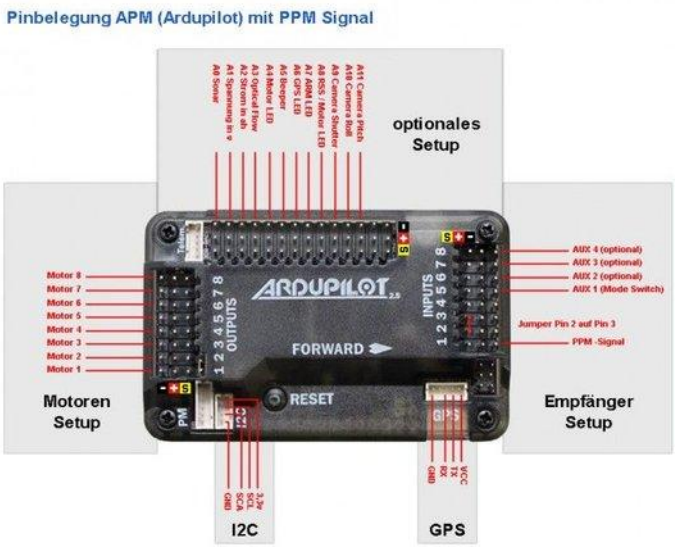
V. APM BOARD CONTROL

The ArduPilot Mega board can control Planes, Copters and Rovers. All you need to do is load the appropriate software onto the board with a few clicks

FEATURES:

1. Arduino Compatible!
2. Includes 3-axis gyro, accelerometer, along with a high-performance barometer
3. On-board 4 Megabyte Dataflash chip for automatic data logging
4. Optional off-board GPS,u-box LEA-6H module with Compass.
5. One of the first open source autopilot systems to use Intenseness' 6 DoF Accelerometer/Gyro MPU-6000.
6. Barometric pressure sensor upgraded to MS5611-01BA03, from Measurement Specialties
7. Atmel's ATMEGA2560 and ATMEGA32U-2 chips for processing and USB functions respectively.





VI. POWERING THE FLIGHT CONTROLLER:

The easiest way to power the APM2.x is using a 3DR Power Module with a LiPo battery. To wire a power module, connect the red-and-black two wire cable on the power module to the PDB red and black two-wire. Connect the power module to the APM PM port using a 6-position cable. Connect the PDB multi-wire cable to APM Output Signal pins with the M1 wire connecting to the signal pin labelled 1, M6 and signal pin 6, etc. See the above link for additional detail.

VII. CONNECT ESCS AND MOTORS

Connecting the ESCs and Motors explains how to set up the connections, and the motor configuration setup for each frame. You will need to connect motor cables to electronic speed controller (ESC) bullet connectors (each motor must connect to only one ESC).Connect ESC Dean's connectors to Power Distribution Board (PDB) Dean's connectors. Connect three-wire cables from the ESCs to the PDB signal pins according to motor number (see link above to find the motor number configuration for your frame). Connect the ESC for motor 1 to the PDB pins marked M1, motor 6's ESC to the pins marked M6, etc.

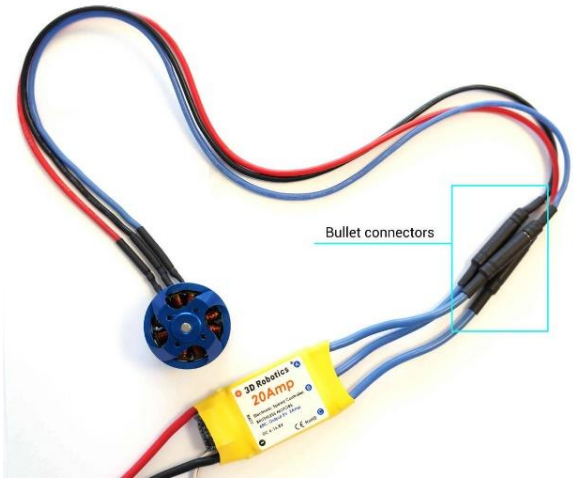
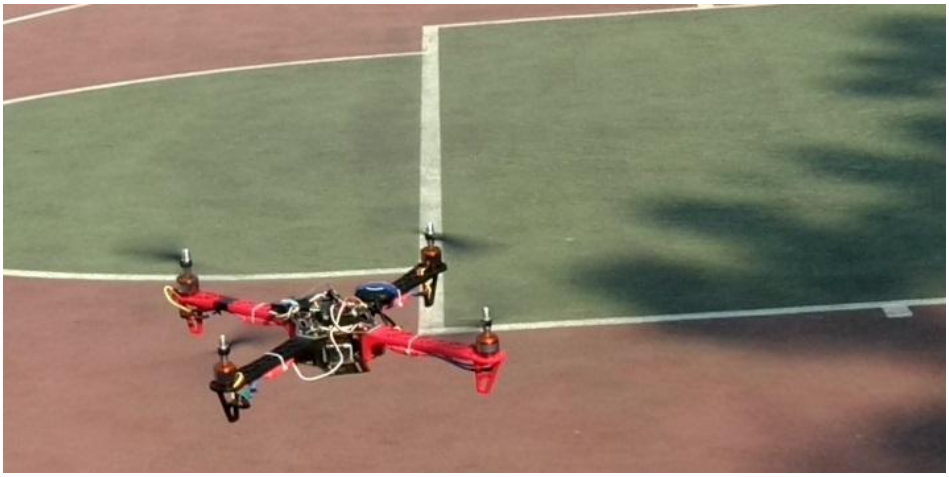


Fig. 1 ESC (electrical speed control)

VIII. OVERVIEW

Like any computer, the APM needs a power supply with a steady clean voltage and sufficient current.3DR provides a 3DR Power Module that supplies 2.25A at 5.37V. The module is designed to convert power from the main flight battery (18 Volt maximum). That module will supply sufficient power for your APM, and low power radios including your RC receiver (without servos). Your RC receiver can be powered from any APM Input (+5V and ground). This is normally done by connecting a 2 or 3 wire cable between an APM Input and one of the output channels on the RC radio. If you are using any servos such as are required with a traditional helicopter or a camera gimbal, you will need to provide an additional dedicated power supply for the servos. The APM is intended to control servos, not power them.

The following sections describe the APM power circuit (you will need to understand this in order to design a power supply for your APM, or provide additional power), and your options for powering the APM and connected components.



IX. APPLICATIONS

1. Accident Zones
2. Hilly regions
3. Highways and cities
4. Clumsy areas which vehicles can’t find a path
5. Hospitals

IX. RESULTS

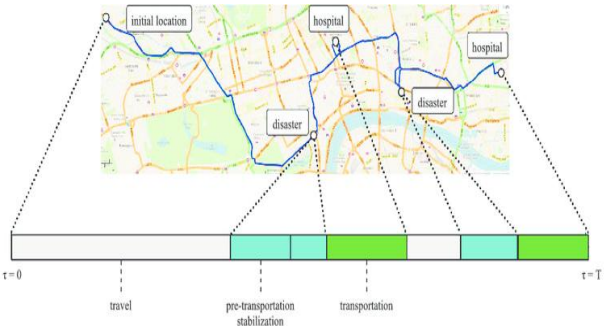
The following results were observed:

(I)The proto type of the quad copter was developedsuccessfully.

ii) The development of the quad copter was done and amed box was installed at the base of the quad copter.

The drone was able to fly within the specifiedRange.

iii)The speed of the drone is high where compare to ambulance to reach the accident zone.



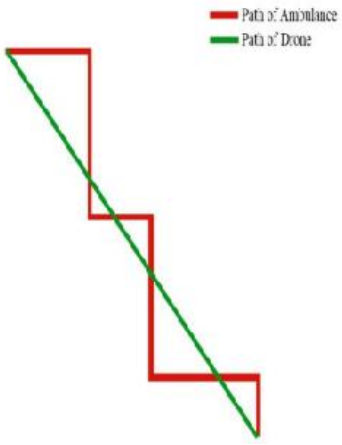


Fig: path of drone and ambulance

iv) Flight time of the drone is more than 10min.The drone is designed in order to achieve a mixed flight time of 10 minutes. A mixed flight time incorporates an average flight time of hovering and manoeuvring.

v)Drone will be able to fly for a minimum range of one mile. The one mile range will incorporate a half mile of carrying the med box and another half mile without the med box. The one mile range is an estimate trip distance for med kit within GeethanjaliCollege's campus.

vi) The drone is designed to be safe to control and maneuver. The drone design will be stable in flight during moderate wind conditions (wind speeds of 10 mph or less).

X. CONCLUSION

This project aims to design a fastest emergency first aid services. It overcomes the issue of loss of lives in terms of reaching the accident spot in time, immediate first aid to the victim.it is eco-friendly designed drone and helps to save human life in minutes. It control over the transmitter pass signals to the receiver in drone and reaches the victim location by tracking with GPS system. The project will be rise of the survival rate to 8% to 80% .This project can be an emergency approach to the medical system present in Hospitals.

REFERENCES

[1] 'Topology Design of Structures', M P Bendsøe and C A Mota Soares, NATO ASI Series, Kluver Academic Publishers, Dortdrecht, The Netherlands, 1993.

[2] 'Optimisation of Structural Topology, Shape and Material', M P Bendsøe, Springer-Verlag, Heidelberg, Germany, 1995.

[3] National Aeronautics and Space Administration

[4] http://en.wikipedia.org/wiki/Aircraft.

[5] Lars Krog, Alastair Tucker and Gerrit Rollema Airbus UK LTD, APPLICATION OF TOPOLOGY SIZING AND SHAPE OPTIMIZATION METHODS TO OPTIMAL DESIGN OF AIRCRAFT COMPONENTS

[6] "Modelling and Simulating Dynamics of Missles with Deflettable Nose Control" Gao Yuan, Gu Liangxian, pan Lei college of Astronautics, Northwestern Politechnical University, Xian 710072, China

[7] "Assessment of Aerodynamic and Dynamic models in a comprehensive analysis for rotorcraft" wayne johnon NASA Ames Research Center, Moffett Feild, CA 94405, U.S.A

[8] Talke, F.E., "Optimization: Computer Aided Analysis and Design." Class Notes. MAE 292. UC San Diego, Spring 2006.

[9] Schneider, Detlef, and Erney, Thomas. "Combination of Topology and Topography Optimization for Sheet Metal Structures." OptiCON 2000 Conference Proceedings.

[10] Altair Engineering. "Altair HyperMesh: Introduction to FEA: Pre-Processing Volume I." HyperWorks Training Manual, 2004.

[11] Altair Engineering. "Altair OptiStruct: Concept Design Using Topology and Topography Optimization." HyperWorks Training Manual, 2004.

[12] Fornace, L.V., Davis, A.E., Costabile, J.T., Hart, J.D., Arnold, D., "Traction Control Systems: FSAE Vehicle Acceleration Optimization." MAE 171B Final Report. UC San Diego, 2005.

[13] Taylor, Rob. "F-35 Joint Strike Fighter Structural Component Optimization: Lockheed Martin Aeronautics Company." Optimization Technology Conference. 27-28 September 2005. Troy, Michigan, USA.