Project Report
On

MEDI - SKY

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Submitted to the Department of Electronics & Communication Engineering
in partial fulfillment of the requirements
for the degree of
Bachelor of Technology
In
Electronics & Communication Engineering

JSS Academy of Technical Education, Noida
Dr. A.P.J. Abdul Kalam Technical University, Lucknow
MAY-2019.

ABSTRACT

Imagine getting assistance at your fingertips in the case of emergency. Yes, the system delivers the assistance in case of medical emergency or disaster (manned/unmanned). This assistance providing drone system (Medi – Sky) working would be very smooth for customers, as swift as booking an Ola/Uber. The drone system that delivers medical emergencies at your house. For short, this system would be useful in the case of emergency. It can also be inducted during fire breakouts and can be used to get control over the fire with the help of foam/fireballs. This system can overcome the daily obstacles such as traffic jams and overcome the wastage of time and energy inducted during the treatment. This system would be helpful in the case of an emergency and can penetrate sophisticated areas where ambulances can't reach out. This system can also be effective in remote locations. Being conclusive, the system is designed for emergencies and to reach out to the sophisticated area.

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LIST OF ABBREVIATIONS

ANN	ARTIFICIAL NEURAL NETWORK
AI	ARTIFICIAL INTELLIGENCE
ANF	ADAPTIVE NEURO FUZZY
ARIMA	AUTOREGRESSIVE INTEGRATED MOVING AVERAGE
GM	GRAY MODEL
GCA	GRAY CORRELATION ANALYSIS
GRNN	GENERAL REGRESSION NEURAL NETWORK
HR	HEART RATE
HF	HYBRID FORECAST
HS	HYBRID SYSTEM
IOT	INTERNET OF THINGS

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

When a medical emergency takes place, the response time can make all the difference between a life saved and a life lost. With increase in population and the number of vehicles on the road, a lot of accidents occur, which leads to the death of thousands of people every year. Now imagine an emergency requirement of an ambulance to a place where there is a slow-moving traffic or at times, traffic Jam. When there is a patient who is in an urgent need of the doctor's attention, there are chances that the patient might not survive the time that it takes for an ambulance to reach.

The biggest problem is that even if the ambulance goes to a location as close as a couple of miles, it might still take about 10-15 minutes for it to reach the patient or even more. These 10-15 minutes can be vital to decide whether or not a victim will survive. Thus, it is necessary to introduce a distinct means that would take the objective of saving human life, one step closer.

A drone will take off from its base location, i.e. the ambulance and can be driven by humans as well as with autopilot feature. The setup consists of 4-rotating motors each of 1000kv which are enough to produce a decent amount of thrust which help drones to reach at a good amount of altitude. Battery of 5400 maH, 11.1v provides a flight time of approximately 25-30 minutes.

The drone also consists of a GPS and a camera to increase accuracy in finding the patient's correct location. Whereas, the person in need will switch to its live location through a Smartphone featured application. Also, with the use of GPS and telemetry, the controller (service provider) can set the path to the destination.

The drone also comprises various sensors which can measure a patient's real time health parameters. These sensors include an ECG sensor and a heartbeat sensor. Once the drone is reached, the sensor will collect data and will convert them into electrical signals. These signals are then transmitted with the help of Wi-Fi enabled Arduino board, directly to the ambulance in real time. The more in-depth detail will be provided in the coming sections. Furthermore, the project model aims to implement organ transportation during organ transplantation.

1.2 LITERARY SURVEY

In this section a brief review of the literature w.r.t. the work considered in this paper is being presented in a nutshell till date.

Getting back in history, different firms had tried to implement the idea for small scale purposes. In Germany, DHL Parcel has researched three generations of medical drone delivery called 3298 Parcelcopter. The first generation travelled 1 km to deliver blood samples across the Rhine River at Bonn. The second generation tested drone delivery of medications and other urgently needed material for three months in 2014 to Juist, one of Germany's remote North Sea Islands. The Parcelcopter travelled 12 km across open sea.

From January to March 2016, DHL's third generation Parcelcopter tested delivery of over 130 parcels of urgently needed medicines or sporting goods between automated Skyports in two Bavarian Alpine villages. Drone delivery took 8 minutes compared to a 30 minute road trip in winter. The time difference could be significant in a medical emergency. UPS and Zipline are working on a drone network to deliver vaccines and blood to 20 clinics in remote locations in Rwanda. Malaria, infant deaths and mothers dying in childbirth are common in Rwanda. When a rabies vaccine is needed urgently, drone delivery would not be hindered by washed out roads during the rainy season.

Only a third of Africans live within two kilometres of a road that functions year-round. Zipline drones are launched from a nest and make a delivery by dropping items with a paper parachute. After the drone returns to the nest a SIM card and new battery are inserted along with the blood or vaccines for the next delivery. Zipline drones are the size of a large dog and can carry three pounds. They can fly 45 miles in 30 minutes. Their route is tracked and changed with a tablet app.

1.3 MEDICAL SPECIALIZATION

Talking on a specific note, how can it affect a certain medical catastrophe? A young Dutch engineer named Alec Momont tried to deliver the solution through drones. Current statistics do not reflect a promising outcome for victims of cardiac arrest outside the home. Brain death due to cardiac arrest typically occurs between 4 to 6 minutes after the incident, while the average ambulance response time sits at 10 minutes. This has led to a heart attack survival rate of only 8 percent.

The use of drones to speed up emergency response time is ingenious because of their ability to bypass traffic and reach victims anywhere in a 4.6 square mile radius in 1 minute, thus cutting response time significantly. Momont claims that his drones could increase heart attack survival rates from 8 percent to 80 percent. A drone ambulance which is equipped with a medical box comprising sensors such as temperature sensor, ECG sensor and heartbeat sensor which reaches the emergency spot earlier than the ambulance and not only measures the real time health parameters, but also transmits them to the ambulance.

Drone company	Healthcare Items	Delivery Location
Matternet	Blood, Medications	Haiti, Dominican Republic, Papua New Guinea, Switzerland
DHL Parcel	Blood, Medications	Germany
Zipline	Blood, Vaccines	Rwanda
Delft University	Defibrillators	Netherlands

Table 1.1 : Comparison of Drone Healthcare Delivery

The doctor present in the ambulance can analyze the real-time health parameters such as the condition of the heart, provided by the ECG sensor data. This enables them to prepare for the pre-medication to be given to the patient. If the condition is more critical, then the doctor can inform the hospital well in advance to be ready for the next step in saving the patient's life. It also helps the doctor in the ambulance to come prepared by examining the patient's health parameters. This amongst other factors exemplifies how drones are a positive solution to existing problems in emergency medicine.

1.4 WHAT TO DELIVER AND HOW

Drone applications in healthcare include delivery of medicine, defibrillators, blood samples and vaccines. Well, implementation of such drones is brought up by principles of mechanical engineering, electronics engineering and electrical engineering. For designing, different types of sensors, GPS, Micro Controller Units (MCUs) and telemetry will be used. The detailed technical implementation of the Medi Sky drone will be explained in the upcoming section.

CHAPTER 2

CHALLENGES AND IMPLEMENTATION

2.1 CHALLENGES

- To include live tracking in the functional system
- To calibrate the compass accurately.
- To install the telemetry modules perfectly with the drone and our device (laptop/mobile) in order to avoid any misleading of drones.
- To install cameras on our drones.
- To attach medical assistance with our drones.

2.2 FLOW CHART

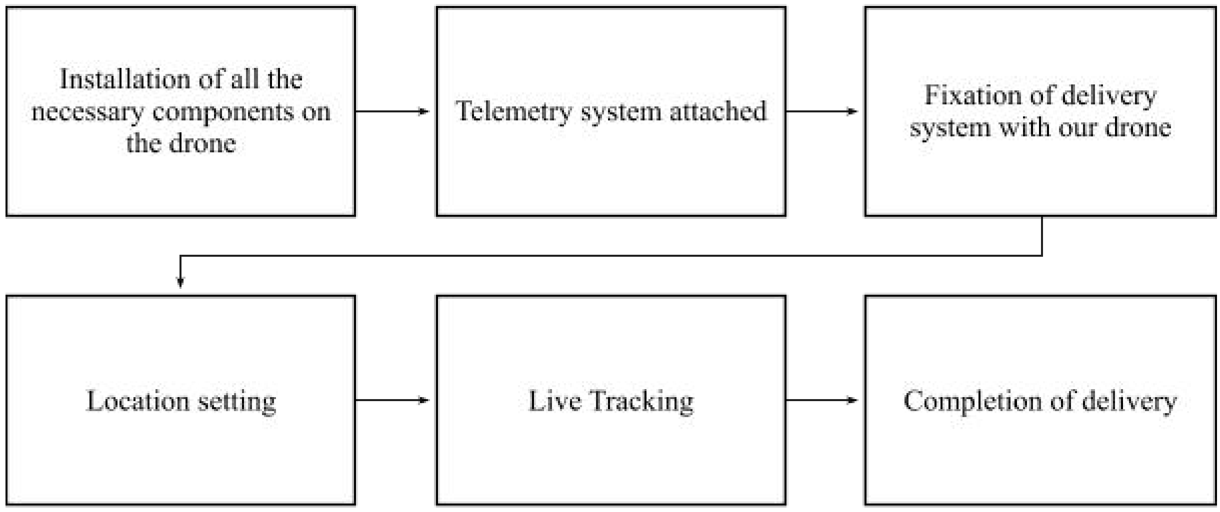


Fig 2.1

2.3 EXECUTION PROCESS

- User shares it's live location through smartphone in the case of emergency.
- User's location is detected by the nearest ground station such as fire station/hospitals.
- The ground team inducts drone for user's assistance.
- Destination is fed to the drone.
- Drone automatically reaches the destination and takes on the body parameters.
- Data is sent to the nearest hospital.
- The needs are delivered accordingly by the drone.

2.4 BLOCK DIAGRAM

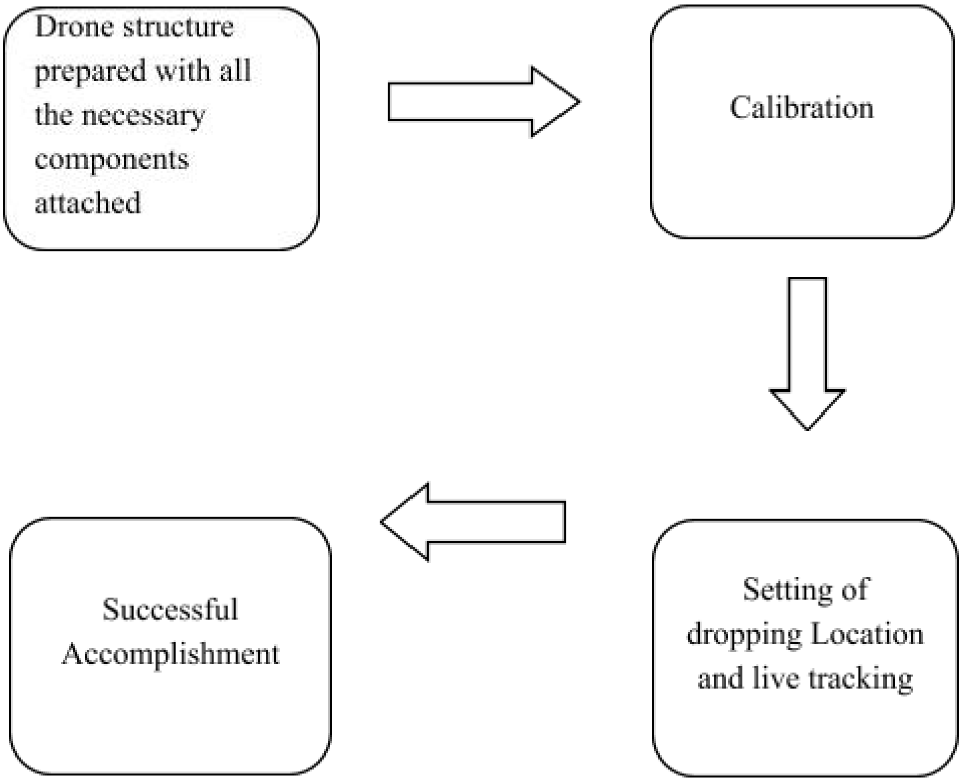


Fig 2.2

2.5 PROCEDURE

STAGE – 1

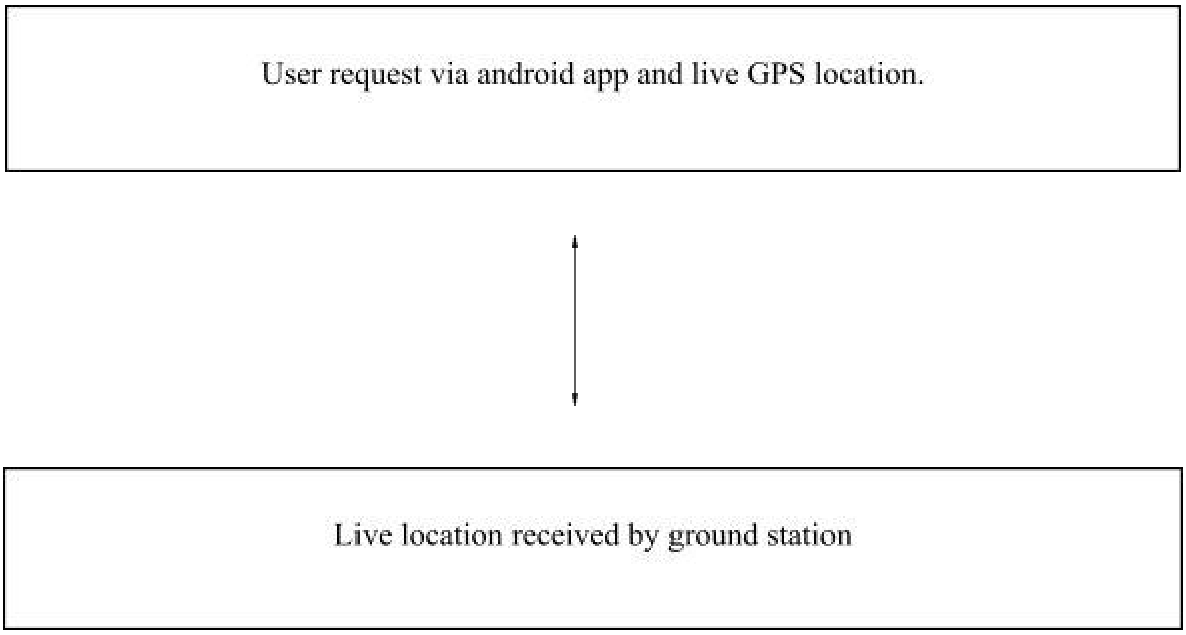


Fig 2.3

STAGE – 2

PART – 1

Live location is received by the ground station

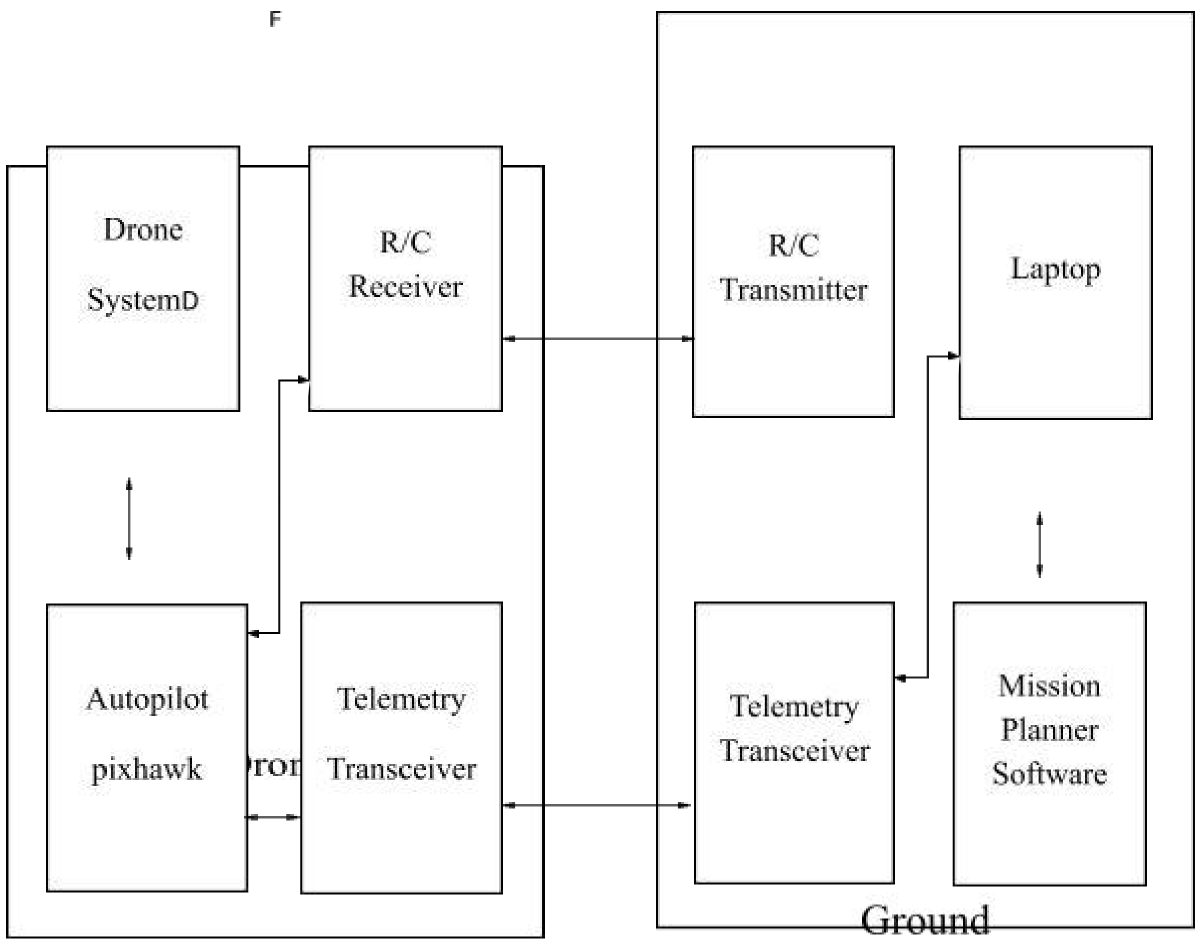


Fig 2.4

PART – 2

Connections of Drone module are shown as follows:

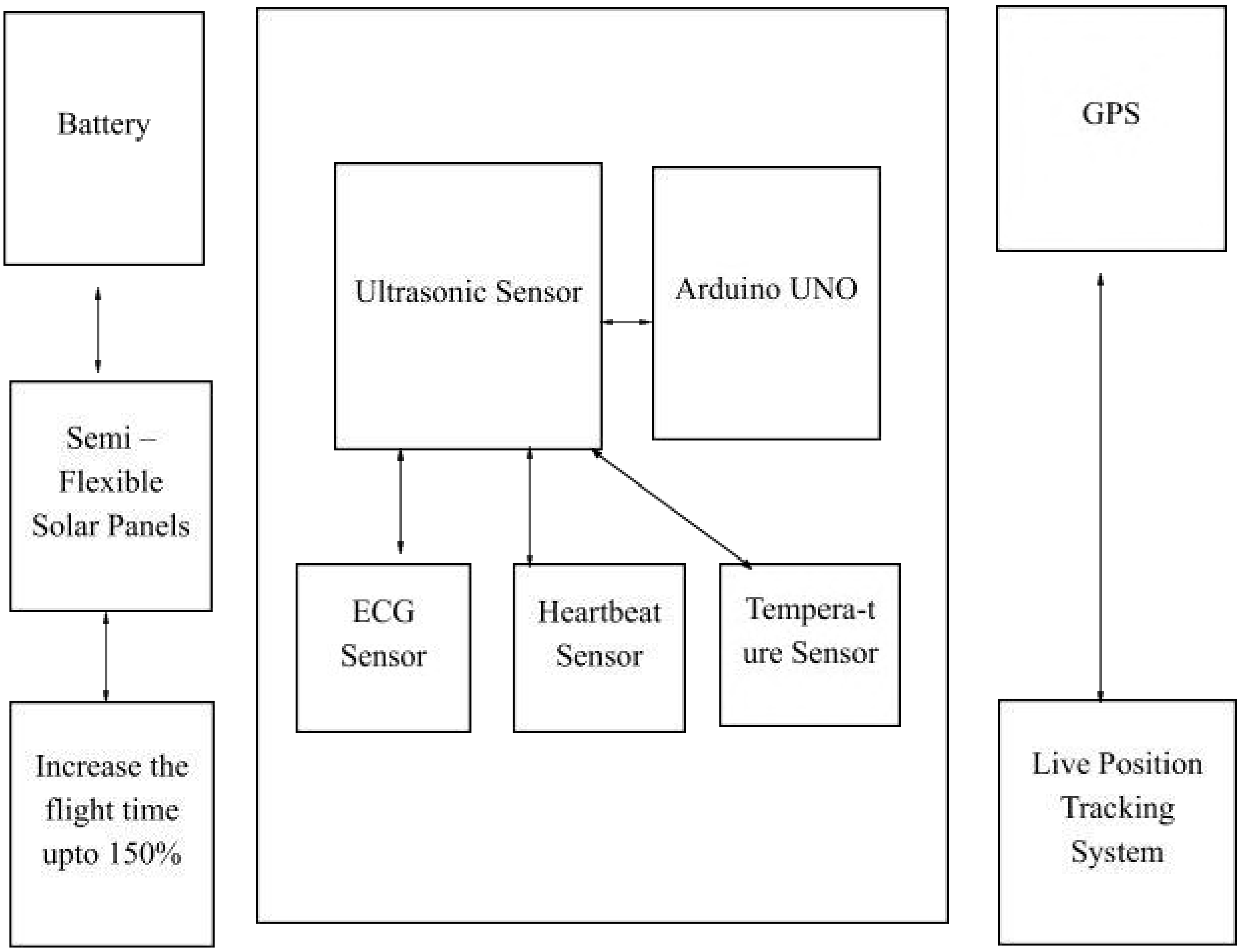


Fig 2.5

STAGE – 3

APPLICATIONS

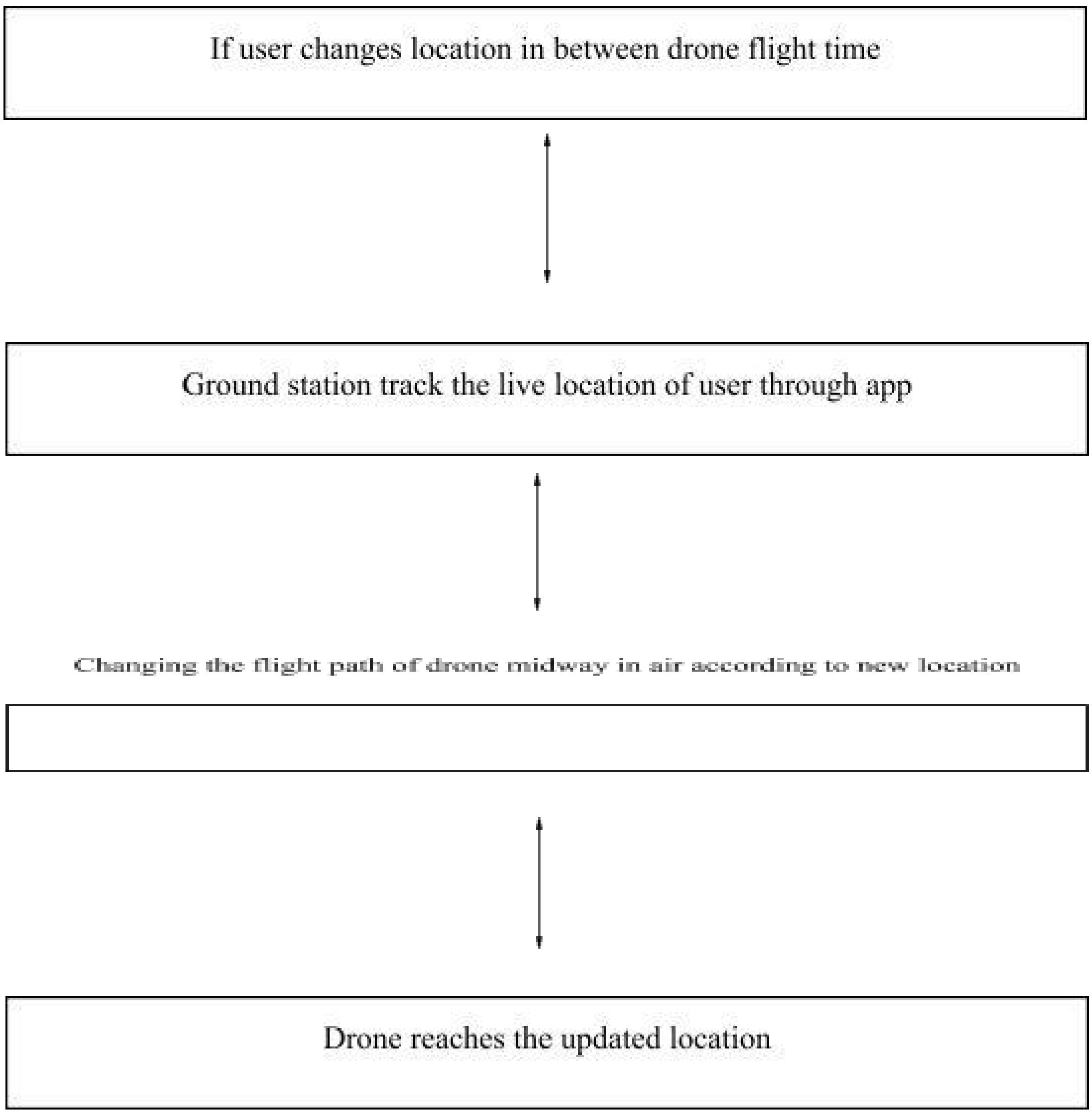


Fig 2.6

CHAPTER 3

COMPONENTS USED AND METHODOLOGIES

3.1 COMPONENTS USED

- 4 BLDC MOTORS
- 4 30A ESC
- GPS AND COMPASS MODULE
- FLIGHT CONTROLLER APM 2.8
- BATTERY 2200MAH
- WIRELESS CAMERA
- F450 FRAME
- REMOTE FLYSKY FS CT6B
- LIPO CHARGER
- TELEMETRY
- 12V LEAD ACID BATTERY

3.2 DESCRIPTION OF COMPONENTS USED

3.2.1 FLIGHT CONTROLLER

ArduPilot Mega (APM) is a professional quality IMU autopilot that is based on the Arduino Mega platform. This autopilot can control fixed-wing aircraft, multi-rotor helicopters, as well as traditional helicopters. It is a full autopilot capable for autonomous stabilization, way-point based navigation and two-way telemetry with Xbee wireless modules. Supporting 8 RC channels with 4 serial ports. ArduPilot Mega consists of the main processor board (red one above) and the IMU shield which fits above or below it (shown mounted together below).

3.2.2 APM FEATURES

- Free open source autopilot firmware that supports planes, multicopters (tri, quad, hex, oct, etc.), traditional helicopters and ground rovers!
- Simple setup process and firmware loading via a point-and-click utility. No programming required! (But if you do want to fiddle with the code, you can with the easiest embedded programming toolkit available: Arduino)
- Full mission scripting with point-and-click desktop utilities
- Can support hundreds of 3D waypoints
- Two-way telemetry and in-flight command using the powerful MAVLink protocol
- Choice of free Ground Stations, including the state-of-the-art HK GCS, which includes mission planning, in-air parameter setting, on-board video display, voice synthesis, and full datalogging with replay.
- Autonomous takeoff, landing and special action commands such as video and camera controls
- Supports full "hardware-in-the-loop" simulation with Xplane and Flight Gear
- 4MB of onboard data-logging memory. Missions are automatically data logged and can be exported to KML
- Built-in hardware failsafe processor, can return-to-launch on radio loss

3.2.3 GPS AND COMPASS MODULE

A GPS navigation device, GPS receiver, or simply GPS is a device that is capable of receiving information from GPS satellites and then to calculate the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer directions. The Global Positioning System (GPS) is a global navigation satellite system (GNSS) made up of a network of a minimum of 24, but currently 30, satellites placed into orbit by the U.S. Department of Defense.

3.2.4 TELEMETRY

Telemetry is an automated communications process by which measurements and other data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring. The word is derived from Greek roots: *tele* = remote, and *metron* = measure. Systems that need external instructions and data to operate require the counterpart of telemetry, telecommand.

3.2.5 Esc (Electronic Speed Controller) 30A

An electronic speed control follows a speed reference signal (derived from a throttle lever, joystick, or other manual input) and varies the switching rate of a network of field effect transistors (FETs). By adjusting the duty cycle or switching frequency of the transistors, the speed of the motor is changed. The rapid switching of the transistors is what causes the motor itself to emit its characteristic high-pitched whine, especially noticeable at lower speeds.

Electronic Speed Controllers (ESC) are an essential component of modern quadcopters (and all multirotors) that offer high power, high frequency, high resolution 3-phase AC power to the motors in an extremely compact miniature package. These craft depend entirely on the variable speed of the motors driving the propellers. This wide variation and fine RPM control in motor/prop speed gives all of the control necessary for a quadcopter (and all multirotors) to fly.

Quadcopter ESCs usually can use a faster update rate compared to the standard 50 Hz signal used in most other RC applications.

Esc rating: current rating – 30A

Voltage: 2-4S Lipo Battery

3.2.6 LIPO BATTERY

A lithium polymer battery, or more correctly lithium-ion polymer battery (abbreviated as LiPo, LIP, Li-poly, *lithium-poly* and others), is a rechargeable battery of lithium-ion technology using a polymer electrolyte instead of a liquid one. High conductivity semisolid (gel) polymers form this electrolyte. These batteries provide a higher specific energy than other lithium battery types and are being used in applications where weight is a critical feature - like tablet computers, cellular telephone handsets or radio-controlled aircraft.

LiPo cells provide manufacturers with compelling advantages. They can easily produce batteries of almost any desired shape. For example, the space and weight requirements of mobile phones and notebook computers can be completely satisfied. Also, they have low-self discharge rate, which is about 5% per month.

Radio controlled equipment and airsoft

3-Cell LiPo battery for RC-models

Fig 3.1

LiPo batteries have just about taken over in the world of radio-controlled aircraft, radio-controlled cars and large scale model trains, where the advantages of lower weight and increased capacity and power delivery justify the price. Test reports warn of the risk of fire when the batteries are not used in accordance with the instructions.

1S=3.7v

2S= 7.4v; 3S=11.1v

3.2.7 BLDC (BRUSHLESS DC) MOTOR

Model: A2212 13T

A2212/13T Technical Data

No. of Cells:	2 - 3 Li-Poly 6 - 10 NiCd/NiMH
Kv:	1000 RPM/V
Max Efficiency:	80%
Max Efficiency Current:	4 - 10A (>75%)
No Load Current:	0.5A @10V
Resistance:	0.090 ohms
Max Current:	13A for 60S
Max Watts:	150W
Weight:	52.7 g / 1.86 oz
Size:	28 mm dia x 28 mm bell length
Shaft Diameter:	3.2 mm
Poles:	14
Model Weight:	300 - 800g / 10.5 - 28.2 oz

Table 3.1

The motor features a 3.2mm hardened steel shaft, dual ball bearings, and has 3.5mm gold spring male connectors already attached and includes 3 female connectors for your speed control. Now includes collet type prop adapter and radial motor mount. Mounting holes have 16mm and 19mm spacing on centers and are tapped for 3mm (M3) screws.

Similar to Welgard A2212-13, AXI Gold A2212/26, Welgard C2830-12, E-Flite Park 400. Great replacement motor for a 1/2A Texaco engine.

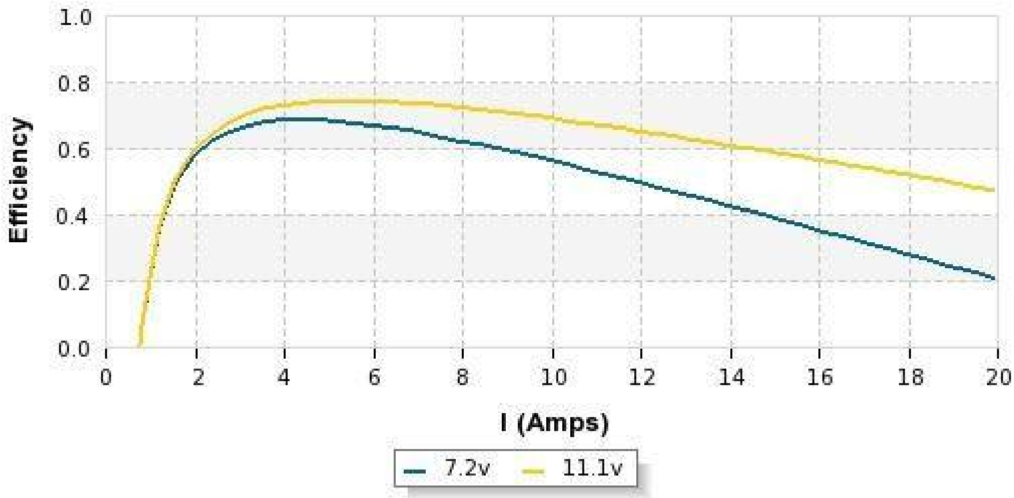


Fig 3.2

I/0 Test Data

Volts	Amps	RPM
7	0.6	7380
8	0.65	8460
10	0.75	10500

Table 3.2

Test Data

Propeller	Gear Ratio	Volts	Amps	Watts	RPM	Speed (mph)	Thrust (g)	Thrust (oz)	Temp (C)
GWS HD 8x4	1	7	3.35	23	6630	25.1	226	7.97	
GWS HD 8x4	1	7.9	4.1	32	7410	28.1	287	10.12	
GWS HD 8x4	1	8.9	4.85	43	8220	31.1	347	12.24	
GWS HD 8x4	1	9.9	5.65	55	8940	33.9	420	14.82	
GWS HD 8x4	1	10.9	6.5	70	9660	36.6	495	17.46	
GWS HD 9x5	1	6.9	5.5	37	6000	28.4	348	12.28	
GWS HD 9x5	1	7.9	6.7	52	6660	31.5	436	15.38	
GWS HD 9x5	1	8.9	7.85	69	7290	34.5	526	18.55	
GWS HD 9x5	1	9.9	9.25	91	7920	37.5	627	22.12	
APC E 10x5	1	6.9	7	48	5610	26.6	406	14.32	
APC E 10x5	1	7.9	8.45	66	6120	29.0	505	17.81	
APC E 10x5	1	8.9	9.9	88	6690	31.7	604	21.31	
APC E 10x5	1	9.9	11.45	113	7170	34.0	702	24.76	
APC E 10x5	1	10.9	13	141	7650	36.2	802	28.29	
GWS HD 10x6	1	6.9	7.2	49	5610	31.9	424	14.96	
GWS HD 10x6	1	7.9	8.7	68	6180	35.1	526	18.55	
GWS HD 10x6	1	8.9	10.1	89	6690	38.0	617	21.76	
GWS HD 10x6	1	9.9	11.7	115	7200	40.9	722	25.47	
GWS HD 10x6	1	10.9	13.25	144	7680	43.6	817	28.82	
GWS HD 10x8	1	10.8	18.2	196	6390	48.4	733	25.86	

Table 3.3

3.2.8 QUADCOPTER PROPELLER

Propeller CW and CCW pairs are used for thrust generation using BLDC Motor.

- Pitch Y(Inch) 4.50
- Diameter X(Inch): 10.00

3.3 METHODOLOGY

3.2.1 PROPELLER DESIGN

Number of Blades for propellers. The lower the number of blades on a propeller, the more efficient the propeller is. The more blades included, the more blade area there is to create more pressure for lift. The Quadcopter model in our project uses quadcopter x configuration.

3.3.2 BRUSHLESS MOTORS

Four electric motors might be used, one to power each propeller. The main advantage of using an electric motor is that it could be mounted directly above the propeller, or integrated directly with the propeller, meaning the motor drives the propeller without any need of a drive train. We are using this motor because it can rotate in both clockwise and anti-clockwise directions. We are using 4 motors and each side 2 motors, two motors are facing upwards and the remaining two are facing downwards.

Quadcopter X configurations is used

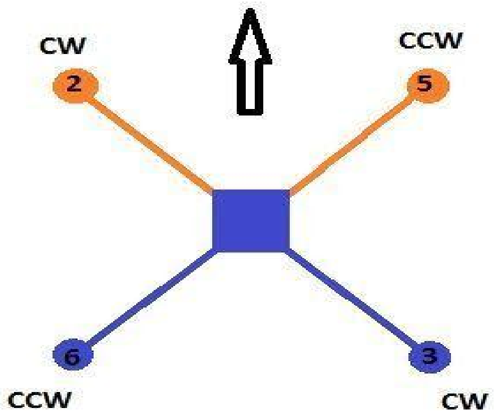


Fig 3.3

3.3.3 FLIGHT CONTROLLER

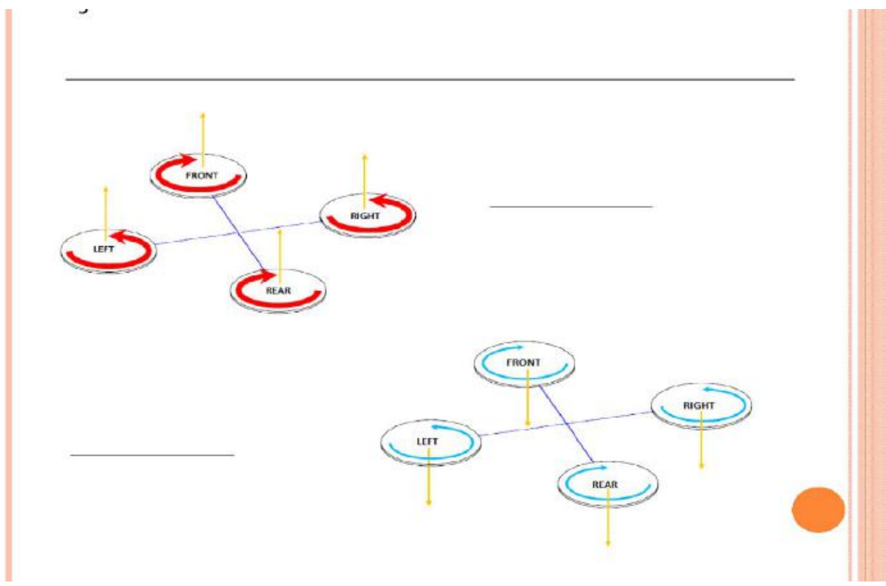


Fig 3.4

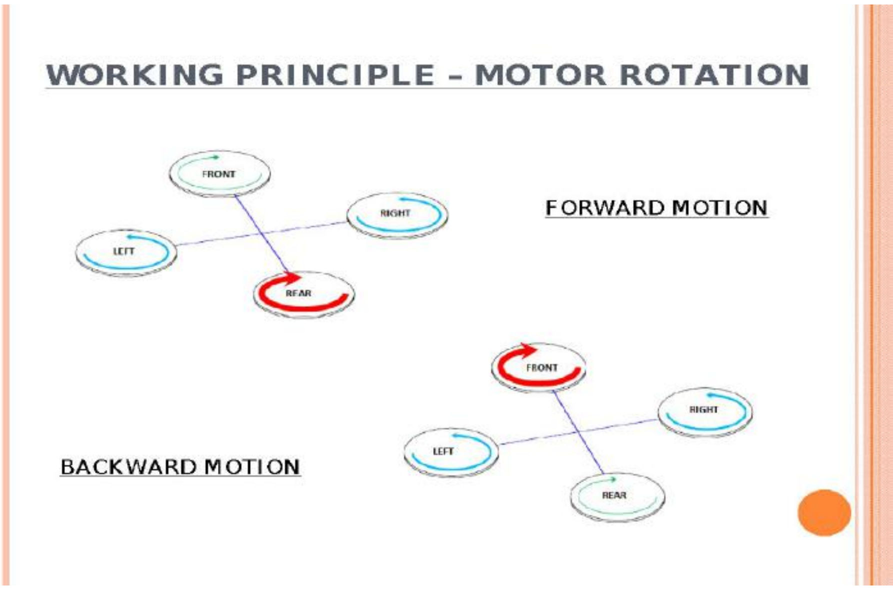

WORKING PRINCIPLE – MOTOR ROTATION
FRONT
RIGHT
LEFT
REAR
FORWARD MOTION
FRONT
RIGHT
LEFT
REAR
BACKWARD MOTION

Fig 3.5

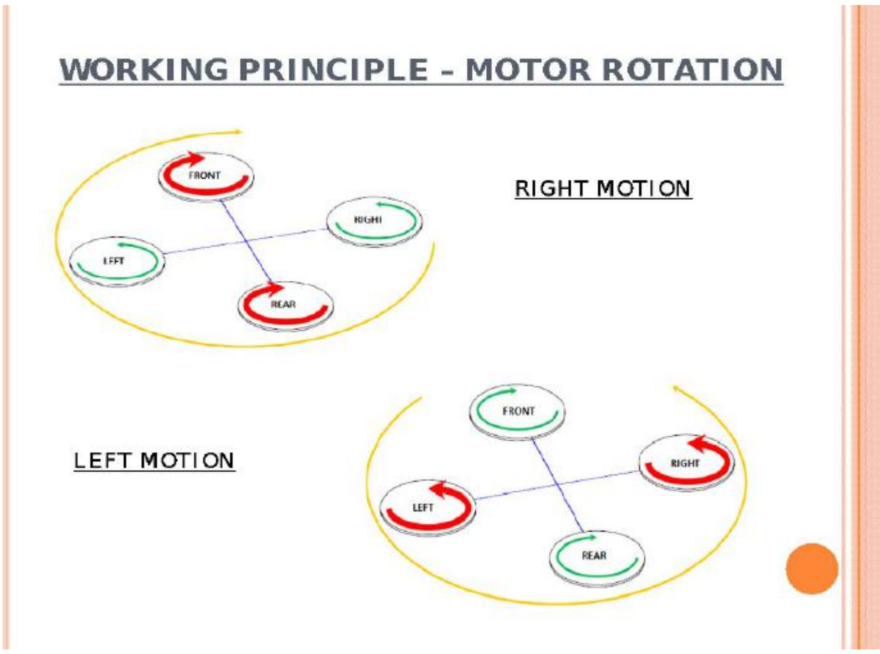

WORKING PRINCIPLE – MOTOR ROTATION
FRONT
RIGHT
LEFT
REAR
RIGHT MOTION
FRONT
RIGHT
LEFT
REAR
LEFT MOTION

Fig 3.6

3.4 FEATURES

- LIVE VIDEO FEED
- RETURN TO HOME
- GEO FENCE

3.4.1 RETURN TO HOME

The quadcopter can return to home position by enabling this function from remote. It reaches the launching position from where it was launched.

3.4.2 LIVE VIDEO FEED

In the live video output from drone camera to laptop screen is seen with a range of around 100m.

3.4.3 GEO FENCE

In this the quadcopter flies within limit with the specifications given to it like height, radius.

3.5 OBJECTIVES:

- Is in search and rescue operations.
- The DRONE would be able to reach some areas inaccessible to road vehicles and helicopters.
- It has the ability to carry supplies if extraction is impossible.
- The response time would be much quicker than a helicopter, and could save many lives.

3.6 APPLICATIONS

- Used in Policing duties
- Can be used Traffic spotting
- Sports events film coverage
- Aerial photography
- Surveillance of coastal borders, road traffic, etc.
- Disaster and crisis management search and rescue.
- Environmental monitoring.
- It has the ability to carry supplies if extraction is impossible.
- The full scaled model could be used as a future mode of transportation

3.7 OUTCOMES

The designed lightweight Hoverbike could successfully achieve lift and stability during flight. It could fly at a range of around 800m within the range of remote control. An endurance of maximum 5-10 minutes was obtained.

CHAPTER 4

MEDICAL ASSISTANCE SET-UP

4.1 PATIENT MONITORING SYSTEM

Health monitoring is the major problem in today's world. Due to lack of proper health monitoring, patients suffer from serious health issues. There are lots of IoT devices nowadays to monitor the health of patients over the internet. Health experts are also taking advantage of these smart devices to keep an eye on their patients. With tons of new healthcare technology start-ups, IoT is rapidly revolutionizing the healthcare industry**. IoT based Health Monitoring System** which records the patient heart beat rate and body temperature and also send an email/SMS alert whenever those readings go beyond critical values. Pulse rate and body temperature readings are recorded over Thing Speak and Google sheets so that patient health can be monitored from anywhere in the world over the internet.

4.2 MATERIALS REQUIRED

- Arduino Uno
- ESP8266 Wi-Fi module
- Pulse rate sensor
- Push button
- 10k Resistor
- Male-female wires
- Breadboard

4.2.1 PULSE RATE SENSOR

Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino. The sensor clips onto a fingertip or earlobe and plugs right into Arduino. It also includes an open-source monitoring app that graphs your pulse in real time.

The front of the sensor is covered with the Heart shape logo. This is the side that makes contact with the skin. On the front you see a small round hole, which is where the LED shines through from the back, and there is also a little square just under the LED. The square is an ambient light sensor, exactly like the one used in cell phones, tablets, and laptops, to adjust the screen brightness in different light conditions. The LED shines light into the fingertip or earlobe, or other capillary tissue, and the sensor reads the amount of light that bounces back. That's how it calculates the heart rate. The other side of the sensor is where the rest of the parts are mounted.

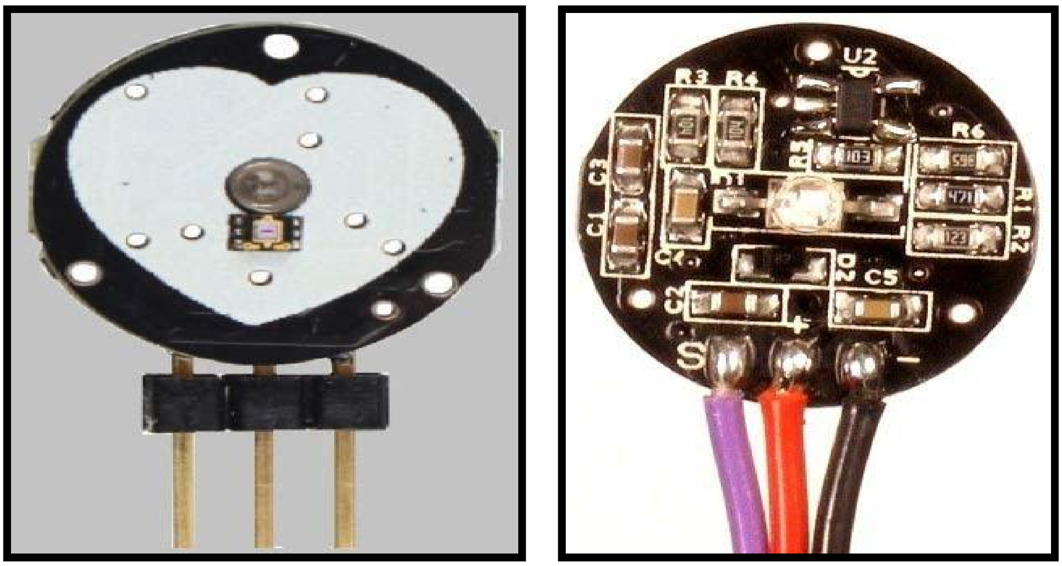


Fig 4.1

Before we use this sensor, we need to protect the exposed side of the sensor so that we can get accurate readings and avoid the short circuit due to sweat. For this, you can use Velcro strip or black tape. As shown in the picture.

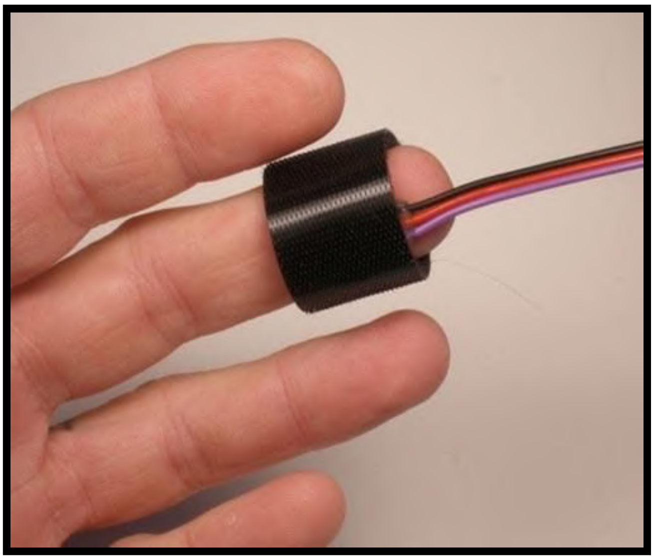


Fig 4.2

There are three wires coming out of the sensor, Signal(S), Vcc (3 - 5 V) and GND.

Signal wire is connected to Arduino Analog pin. The same sensor is used in our Arduino Heart Beat monitoring project.

4.2.2 ESP8266-01

Most people call ESP8266 a WIFI module, but it is actually a microcontroller. ESP8266 is the name of the microcontroller developed by Espressif Systems which is a company based out of shanghai. This microcontroller has the ability to perform WIFI related activities hence **it is widely used as a WIFI module.**

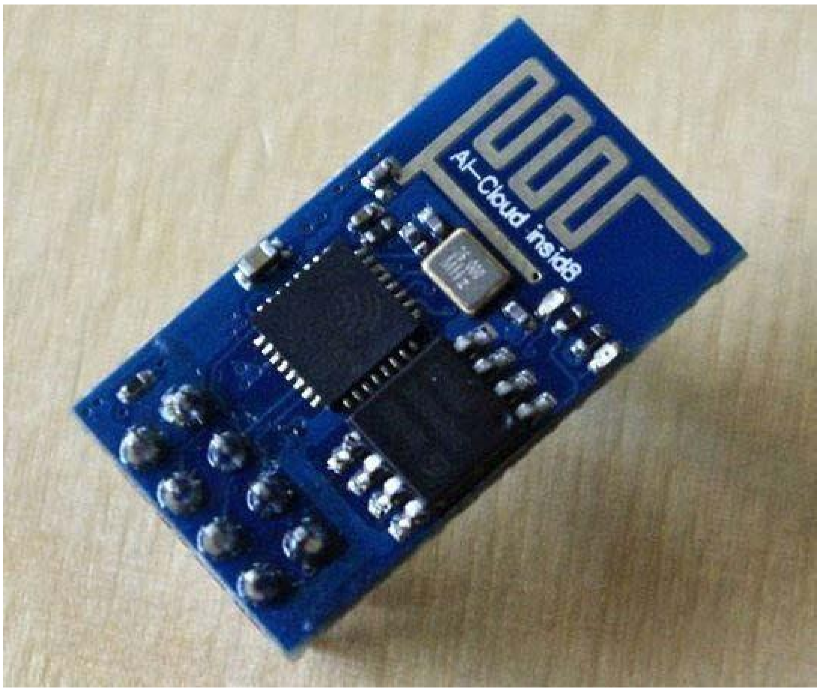


Fig 4.3

There are two ways to work with your ESP8266 module. This tutorial will help you to get started with ESP8266. One way is by using the AT commands. The other way is by using the Arduino IDE. Here we will use AT commands to send data from Arduino to ESP.

4.3 CIRCUIT DIAGRAM

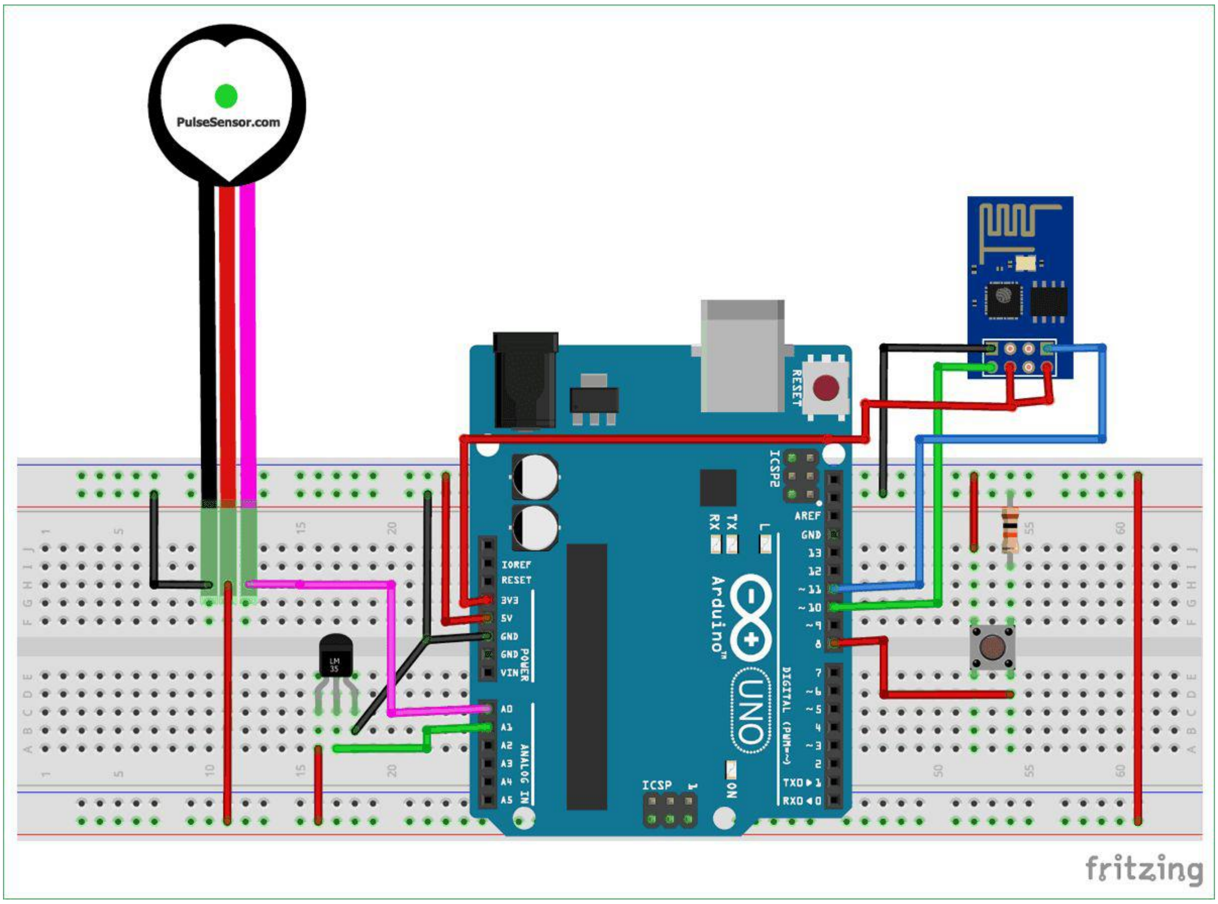


Fig 4.4

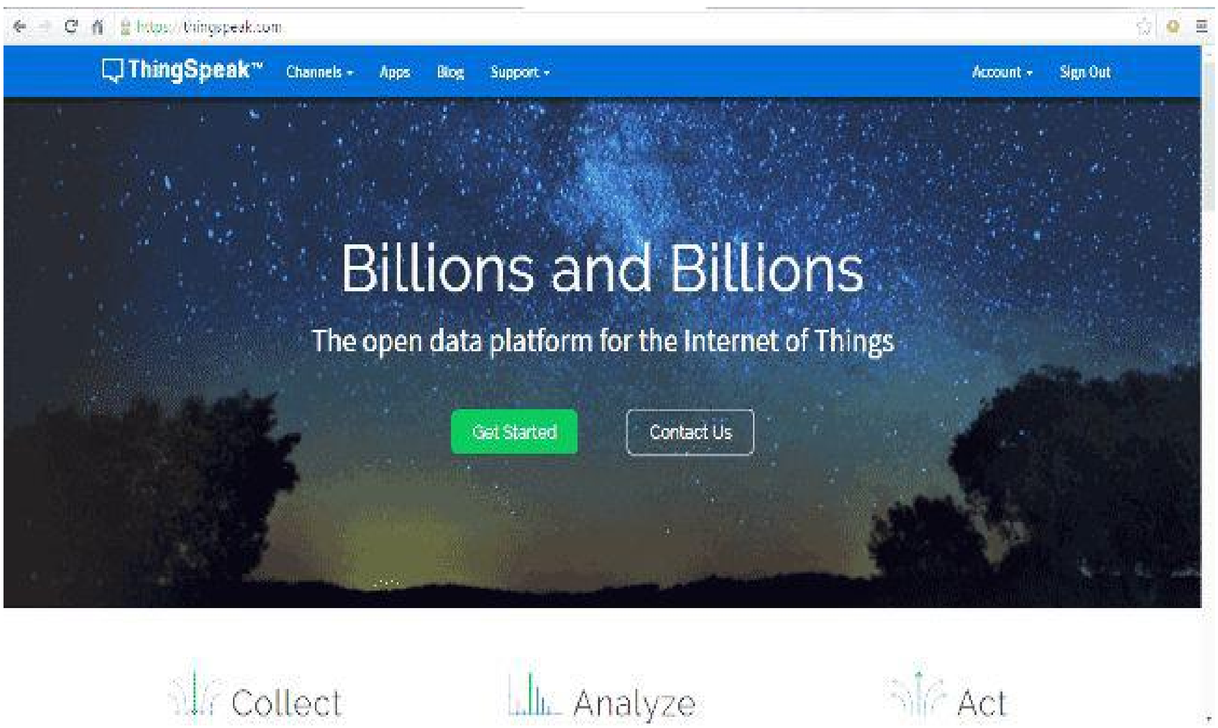
Below are the connections:

- Signal pin of pulse sensor -> A0 of Arduino
- Vcc pin of pulse sensor -> 5V of Arduino
- GND pin of pulse sensor -> GND of Arduino
- Tx of ESP8266 -> pin 10 of Arduino
- Rx of ESP8266 -> pin 11 of Arduino
- CH_PD and Vcc of ESP8266 -> 3.3 V of Arduino
- GND of ESP8266 -> GND of Arduino

4.4 ThingSpeak to RECORD PATIENT DATA ONLINE

ThingSpeak provides very good tool for IoT based projects. By using ThingSpeak site, we can monitor our data and control our system over the Internet, using the Channels and webpages provided by ThingSpeak. ThingSpeak **'Collects'** the data from the sensors, **'Analyze and Visualize'** the data and **'Acts'** by triggering a reaction. We have previously used ThingSpeak in Weather station project using Raspberry Pi and using Arduino, check them to learn more about ThingSpeak. Here we are briefly explaining to use ThingSpeak for this **IoT Patient Monitoring Project.**

We will use **ThingSpeak** to monitor patient heartbeat and temperature online using internet. We will also use **IFTTT**platform to connect ThingSpeak to email/message service so that alert message can be sent whenever the patient is in critical state.



4.5 ARDUINO CODE EXPLANATION

First, we include all the libraries. We are using software serial to communicate with esp8266.

```
#include <SoftwareSerial.h>

#include "Timer.h"

#include <PulseSensorPlayground.h>     //pulse sensor library
```

Make an instance for timer, Software Serial and pulse sensor to use in our code.

```
Timer t;

PulseSensorPlayground pulseSensor;

SoftwareSerial esp8266(10,11);   //Rx,Tx
```

Set your Wi-Fi name, password and IP of thingspeak.com

```
#define SSID "*********"      // "your WiFiname"

#define PASS "**********"   // "wifi password"

#define IP "184.106.153.149"      // thingspeak.com ip
```

Declare String to update information on ThingSpeak channel. You will need an API key for this, which can be found from your ThingSpeak channel-> API key. Copy **Write API key** and paste here.

```
String msg = "GET /update?key=Your Api Key";
```

In *setup* function, set the baud rate for serial communication between Arduino serial monitor and esp8266. Start the ESP communication by giving AT command to it and connect it by calling ***connectWiFi();*** function. After that we will initialize Timers by calling ***t.every(time_interval, do_this);*** which will take the readings of the sensors and update on the channel after every *time_interval* you defined.

```
void setup()

{

  Serial.begin(9600);

  esp8266.begin(115200);

    pulseSensor.analogInput(PulseWire);

    pulseSensor.blinkOnPulse(LED13);           //auto-magically blink Arduino's LED with heartbeat.

  pulseSensor.setThreshold(Threshold);



 // Double-check the "pulseSensor" object was created and "began" seeing a signal.

   if (pulseSensor.begin()) {

    Serial.println("We created a pulseSensor Object !");

  }

 Serial.println("AT");
```

```
  esp8266.println("AT");

  delay(3000);



  if(esp8266.find("OK"))

  {

    connectWiFi();

  }

  t.every(10000, getReadings);

   t.every(10000, updateInfo);

}
```

Make function for **connectWiFi()**, **panic_button()**, **update_info()** and **getReadings()**.

Make function for *connectWiFi()* which will return True or False depending upon Wi-Fi connected or not. **AT+CWMODE=1** will make ESP8266 work in *station mode*. **AT+CWJAP=\,** command, used in this function, is to connect to your Access Point (your Wi-Fi router).

```
boolean connectWiFi()

{

  Serial.println("AT+CWMODE=1");

  esp8266.println("AT+CWMODE=1");

  delay(2000);
```

```
  String cmd="AT+CWJAP=\"";

  cmd+=SSID;

  cmd+="\",\"";

  cmd+=PASS;

  cmd+="\"";

  Serial.println(cmd);

  esp8266.println(cmd);

……

…..
```

Make ***getReadings();*** function to take pulse sensor and LM35 readings and convert them to string using ***dtostrf();***function**.**

```
void getReadings(){

   raw_myTemp = analogRead(A1);

  Voltage = (raw_myTemp / 1023.0) * 5000;        // 5000 to get millivots.

  tempC = Voltage * 0.1;               //in degree C

  myTemp = (tempC * 1.8) + 32;            // conver to F

  Serial.println(myTemp);

   int myBPM = pulseSensor.getBeatsPerMinute();  // Calls function on our pulseSensor object that returns BPM as an "int".
```

```
if (pulseSensor.sawStartOfBeat()) {            // Constantly test to see if "a beat happened".

Serial.println(myBPM);                         // Print the value inside of myBPM.

}

delay(20);
```

Make function for updating sensor information on the ThingSpeak channel.

"AT+CIPSTART=\"TCP\",\"", AT Command will establish TCP command over port 80.

```
void updateInfo()

{

  String cmd = "AT+CIPSTART=\"TCP\",\"";

  cmd += IP;

  cmd += "\",80";

  Serial.println(cmd);

  esp8266.println(cmd);

  delay(2000);

  if(esp8266.find("Error"))

  {

    return;

  }
```

Attach the readings with the GET URL using "&field1="; for pulse readings and "&field2="; for temperature readings. Send this information using “AT+CIPSEND=” command.

```
cmd = msg ;

  cmd += "&field1=";    //field 1 for BPM

  cmd += BPM;

  cmd += "&field2=";  //field 2 for temperature

  cmd += temp;

  cmd += "\r\n";

  Serial.print("AT+CIPSEND=");

  esp8266.print("AT+CIPSEND=");

  Serial.println(cmd.length());

  esp8266.println(cmd.length());

  if(esp8266.find(">"))

  {

    Serial.print(cmd);

    esp8266.print(cmd);

  }

…

…
```

Similarly, make function for *panic_button*. When the button goes to HIGH, esp8266 sends the information to the server using AT+CIPSTART and AT+CIPSEND commands.

```
void panic_button(){

  panic = digitalRead(8);

    if(panic == HIGH){

    Serial.println(panic);

      String cmd = "AT+CIPSTART=\"TCP\",\"";

  cmd += IP;

  cmd += "\",80";

  Serial.println(cmd);

  esp8266.println(cmd);

…..

..
```

Attach this information to "&field3=“.

```
cmd = msg ;

  cmd += "&field3=";
```

In *loop* function, call *panic_button()* and timers using *t.update()* function .

```
void loop()

{
```

```
  panic_button();

start: //label

    error=0;

    t.update();

……
```

CONCLUSION

The system will deliver a very positive result to the people in need. The system is designed to help the needy with better medical facilities. Well, this system covers all purposes of age groups. Medi-Sky covers rural as well as urban regions. Catastrophic situations don't cover any specific age group, income levels or geography. The system is under development and will bring the affirmative results and help a lot of people. The aim is to design a drone carrying medical applications. These medical applications will help to benefit the needy.

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, 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. A drone or a quadcopter takes an aerial route and is not driven by humans. Using more motors and propellers will produce more thrust, this is the main highlight of the work.

RESTRICTIONS

It's not just about implementation; it's about law and order too. The United States and the UK allow their citizens to fly the drones at the permissible height of 400-500 ft. Also, drones have been criticized for inadequate regulation, safety issues and security and privacy abuse. Furthermore, irresponsible drone owners have been a nuisance in cases related to photographing accidents or fires and interfering with emergency responders. Other concerns are that people would shoot down drones and steal drone packages. These issues may hamper the growth of the project. Alec Momont, who tried to implement the same idea, was blocked due to law and orders. Hence, obstructing the technological advancement for the healthcare system.

FUTURE WORK

A lot further headways should be possible. The automaton can be made self-ruling. The GPS module can be utilized to gain the area of the objective and AI can be utilized to assist the automaton with calculating the most brief way to achieve the goal. A camera can be actualized in the automaton with the goal that the present circumstance can be seen by the specialist in the emergency vehicle. A considerably more powerful automaton can be produced for doing this particular activity. Use of automatons in the restorative business is a creating field which has a colossal extension for further research.

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