

## Messaging System Using Drone

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**Abstract** - Now a day's in every Educational organization, it is required to have a surveillance system to control various activities happening in the campus. Drone i.e. quad copter is the best way to do it. In spite of complexity, it can fly for hours and can send signals to a control section in order to monitor the actions. So we have designed a flying system using raspberry pi in such a way that can be travel over the campus & suitable for higher authorities to have control. In this drone we attach a camera for video shooting and audio system is added through which we can give command or any message.

Here we use android application through which we can control the movements of drone. In this system drone we use Raspberry-pi as a flight controller. Here we use dual tone Multiple Frequency (DTMF) decoder system for interfacing android application

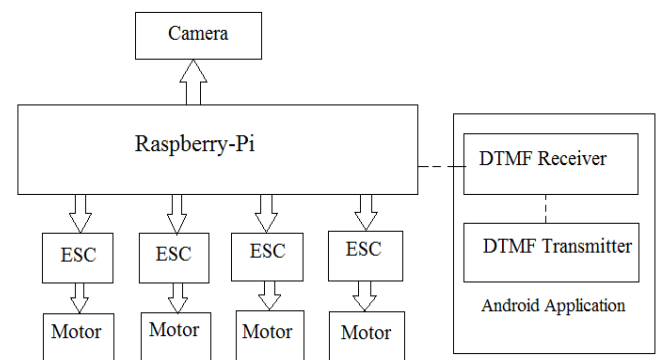
**Key Words:** DTMF-dual tones multiple frequency.

### 1. INTRODUCTION

It is a need of time to have a surveillance system that can monitor day to day activities remotely happening over a region. Our plan is to build a low cost, low power, highly efficient drone for surveillance purpose. The drone will be designed to be as light weight as possible in order to maximize its flight duration. We intend for the drone to

carry a video camera which will useful to see live video streaming and or recording too. We are going to design drone based on Raspberry-Pi as a flight controller which is a low power, open source. Here we use Python language for programming the Raspberry-Pi. The combination of performance and versatility perfect for a wide range of industrial applications also uses for robotics, motor drives, twitter printer, data backup, SDR base station In our project we use android application as alternative to joystick i.e. using android application; we control the drone. By using this android application we transmit signal for moving drone in roll, pitch and yaw direction. For interfacing Raspberry-Pi and smart phone we use DTMF transmitter and receiver. Additional we are going to make audio system. Using that we are convey the message to the students.

### 1.1 Block Diagram



## 1.2 The System Hardware

- Flight controller-Raspberry-pi
- Electronic Speed Control (ESC)
- Brushless Motor
- IMU Sensor
- Propellers
- Camera

## 1.3 Brushless Motor

Under Electrical Motor a DC motor in simple words is a device that converts direct current (electrical energy) into mechanical energy. It's of vital importance for the industry today. When we run Drone, we need two clockwise and two counter-clockwise motors. So the design of this motor is that the clockwise motor is spinning with counter-clockwise thread to avoid the Nut (the top spinner) loosening from the motor.

## 1.4 IMU Sensor

The Inertial Measurement Unit (IMU) is a single unit in the electronics module which collects angular velocity and linear acceleration data which is sent to the main processor. The IMU housing actually contains two separate sensors. The first sensor is the accelerometer triad. It generates three analog signals describing the accelerations along each of its axes produced by, and acting on the vehicle. Due to thruster system and physical limitations, the most significant of these sensed accelerations is caused by gravity. The second sensor is the angular rate sensor triad. It also outputs three analog signals. These signals describe the vehicle angular rate about each of the sensor axes. Even though the IMU is not located at the vehicle

center of mass, the angular rate measurements are not affected by linear or angular accelerations. The accelerometer triad and angular rate sensors within the IMU are mounted such that their sensor coordinate axes are not aligned with those of the vehicle.

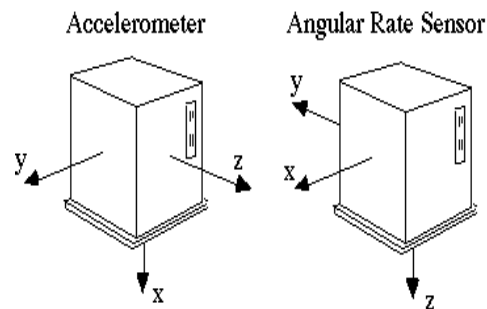


Fig -1: sensor

## 1.5 The System Software

In this project we design two types of software:

- 1] Android Application: By using this application we interface Raspberry-pi and smart phone. This application developed by using Dev kit tool.
- 2] Raspberry-Pi Programming: Here we programming for PWM pulses of Electronic Speed Control which are interface to the Raspberry-pi board.

## 2. SYSTEM OPERATION

In this project we are going to use Raspberry-pi board as a flight controller. Using general purpose input output (GPIO) we can interface the external device and gives command to board to move and fly the drone to the required direction. Using android application we control the drone's movement by interfacing the mobile to raspberry-pi through DTMF decoder. From mobile we will call to the DTMF decoder and because of this connection will make between mobile and board. Here there are three conditions for moving that are as follows-

1. Roll:  $\Phi$  is a Rotation of drone around front-to-back axis.
2. Pitch:  $\theta$  is rotation of drone around left-to-right axis.
3. Yaw:  $\psi$  is rotation of drone around vertical axis.

Here the two motors are moves in clockwise direction and two in anticlockwise direction. Because of this pattern of motor we can move drone in any of direction in desired manner. Also if any movement has to do then two motors speed are increases and another two motors speed decreases. In this project also we can give instruction using audio system. In that the user can give an instruction and this sound is reproduced at the Drone by using loudspeaker.

### 3. APPLICATIONS

Drone provides following applications:

- Monitoring: Drone covers all campus area and monitoring whole campus area.
- Surveillance: Using drone we keep area under observation.
- Video grapey: As we attach camera to the drone, we can take video shooting of certain area.
- Messaging: Using audio system we can give any message or command to the campus.

### 3. CONCLUSIONS

Using android application on smart phone we control the direction of drone according to pitch, roll and yaw movement. So we can efficiently fly the drone. Here we will generate the audio and we can control the campus area. So this system is very useful in very huge organization for governing purpose. Because of this system human efforts can be reduced.

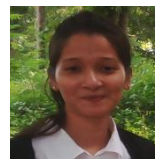
Mainly this system is focus for navigation and military purpose because of present condition. Therefore there is

need for observation and control of area. Also there is lots of requirement of security. For that purpose this system is very useful for observing and for giving any type of instructions to human being.

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