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# Camouflaging Drone with Enemy Tracker

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**Abstract -** *Many-a-times on National frontiers connecting rival nations, situations arise wherein it becomes crucial to detect the presence of enemy onsite. Human intervention, tank operations in order to detect the enemy becomes extremely unsafe and leads to the death of Human resources. This ratio can be avoided if it is done by an inhuman body such as a drone which gives the live location of the enemy on the Warfield, along with being invisible to the enemy due to the camouflaging concept. Camouflage drone is mechanized such that it can be used for military operations such as enemy detection and transmission of geographical coordinates. Eventually, the chief feature being the color change which makes the detection of the device almost impossible. The core mission of our project is to design a model that will contribute towards the National security and the help soldiers on the Warfield. Excellency of this drone is in being operated wireless from remote which offers no risk to the soldier lives.*

***Key Words*: Camouflage, GPS, Drone, Surveillance, Color Sensor**

## 1.INTRODUCTION

### 1.1 Background

UAV technology enhanced mainly during World War II and the Cold War but it was expensive, unreliable, and not as great as the Flying Fortress and the SR-71 Blackbird. Also, it is known that many countries used these technologies to spy on each other, but the information is still not that clear. Previously the drones were used for military purposes but now they are used for a wide range of operations such as providing food during natural calamities, monitor various climatic changes, etc. Drones are mainly used for combat surveillance and tactical reconnaissance. In the case of combat surveillance, the human pilot flies the drone in order to detect the presence of the enemy whereas, in the case of the tactical reconnaissance, it comprises a mini drone that is operated in the autopilot mode and is used for taking pictures on the field.

### 1.2 Evolution

The evolution of drone technology is commendable. Various advancements have been seen such as the Altair Aerial (creating the easy to fly drone) and the Chinese company EHANG which wants to make a drone into a taxi service. The Massachusetts Institute of Technology has invented a honeybee sized drone which has some great features such as the navigation chip which can process complex images up to 171 frames per second. Some other varieties of drones include the ones that can change their shape according to the available space.

### 1.3 Concept

Camouflaging is nothing but making the object untraceable by merging with the surrounding objects. We are designing this project to implement a camouflage drone that can locate the enemy, send the real-time coordinates to the army, and gather the information about specific targets by video recording.

## 2. LITERATURE SURVEY

1. Camouflage Technique Based Multifunctional Army Robot, containing blue-tooth module, PIR sensor microcontroller and a passive Infra-red sensor to detect the changes in the surrounding object by measuring the infrared levels made by the movement of the object.[1]
2.Mobile military security with a concentration on unmanned aerial vehicles investigates the increasingly complex issues confronted when implementing security in the mobile computing and operations efforts with military Unmanned Aerial Vehicles (UAVs). These newer approaches for implementation of UAV technology share similar intricacy and security risks with the mobile military security battlefield. The predominant benefits include the safeguarding of lives in combat, homeland, emergency, and affected areas.[2]
3.The major goal of this project being Surveillance using a camera attached to an aerial object. Transmission of the video in FPV goggles to increase flight time and make it cost-efficient.[3]
4. A brief survey to show state-of-the-art studies on amateur drone surveillance. Dragnet a new vision recently emanating Cognitive Internet of Things reference for surveillance using the drone. After this, they describe the key features of Dragnet in detail, along with the technical obstacles and practical issues.[4]

## 4. OBJECTIVES

1. To make the drone visually untraceable.
2. To provide live co-ordinates of enemies to the army.

3. To provide the live video streaming of the enemy territory.

## 5. SYSTEM BLOCK DIAGRAM

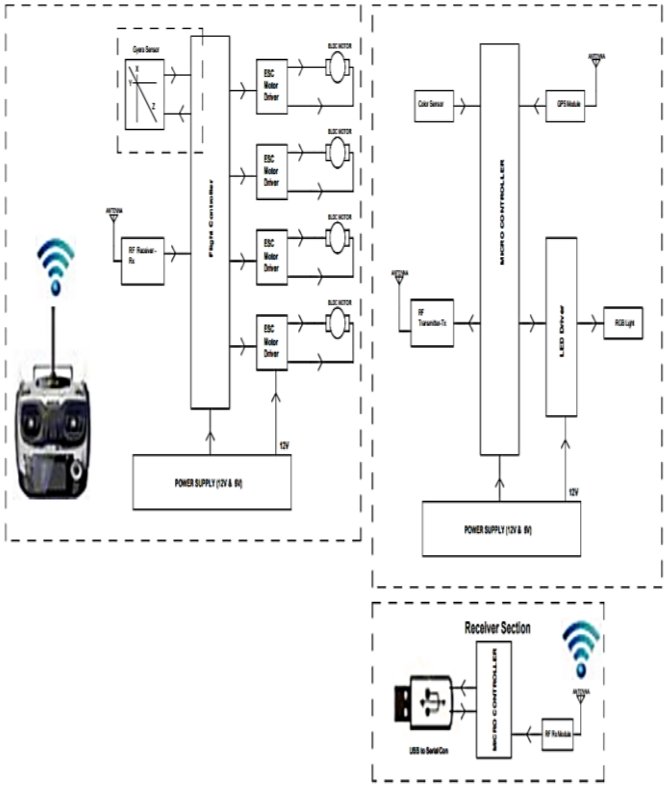



**Fig -1:** Block Diagram

The microcontroller is the heart of the system processes the data received and the necessary thresholding. The major modules of the Systems are as follows-

### 5.1 Flight controller:

A command from the pilot for the drone to move forward is fed into the flight controller, which determines how to manipulate the motors accordingly. The flight controller transfers the data to the ESC module. The ESC module receives rpm data from the flight controller and RC receiver to control the speed of each BLDC motor. The BLDC motor and flight controller are connected through the ESC module. Given that each brushless motor requires an ESC, the quadcopter will require 4 ESCs. In accordance with the signal received from the flight controller the ESC makes the brushless motor spin.

### 4.2 Color detection:

The TCS230 color sensor is used to sense the color with the help of the 8 x 8 array of photodiodes and then using a Current to Frequency converter the photodiode readings are converted into a square wave which can be read with the help of micro controller. The photodiode comprises of 16 red filters,16 blue filters and 16 green filters along with the other 16 photodiodes that are clear with no filters. The photodiodes are connected in parallel and with the help of the two control pins S2 and S3 we can select which of them will be read. The color which is to be detected its corresponding 16 photodiodes should be used by setting the two pins to the desired logic level.

### 4.3 GPS Tracking:

The design is based around a PIC16F type advanced microcontroller. A GPS module sends NMEA sentences to the microcontroller every second via a serial TTL interface. The microcontroller receives the NMEA sentences, extracts the GPRMC sentence, and then extract the time, latitude, and longitude of the user coordinates and sends it to the PC Via RF Module. This GPS Data is compatible with the Google Earth mapping software, using the GPS Visualizer (www.gpsvisualizer.com) software package. The drone's movements can be tracked on a street-level map using Google Earth software. GPS module Tx pin connected to MCU Port pin RC7. This Pin Used as Serial data Reception Pin.

### 4.4 Camera:

The camera simultaneously captures video and sends the signal to the transmitter. The ST TX01-ASK transmitter requires 12V to operate, so therefore you can directly obtain a 12V from the power distribution board as you are using an 11.1V Lipo battery to power the drone. The camera obtains power via the transmitter. Video from an onboard camera is transmitted by radio to a personal video display on the ground in the form of a screen. The camera is installed at the front of the drone and transmitter. You can receive the videos transmitted by the drone to AV screens like TV or desktop at the ground station by using the ST-RX04-ASK receiver.

## 5. HARDWARE IMPLEMENTATION

### 5.1 Design:

The frame is the most important part of the quadcopter and it is the chassis on which the motors, propellers, power cells and other electronic parts are mounted on. Frame size is chosen depending upon the weight of the components and the frame needs to be strong and stable. The size selected for our frame was 16*13 after trial and error. The materials play a significant role in determining the drone's stability , efficient performance and the

materials used in the arms should be effective in minimizing vibrations. The commonly used materials include the aluminum and fiberglass. The stiffness of the frame is important in order to have a smooth flight and stable videos and photographs.

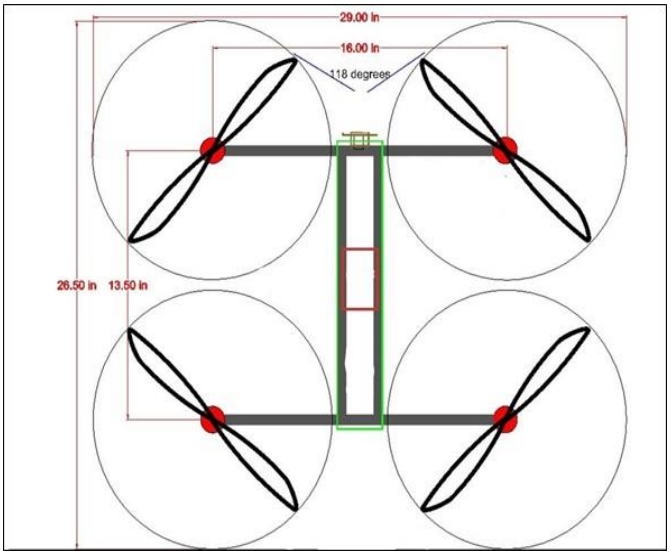



**Fig -2**: Framework Design

### 5.2 Color Sensor

The TCS230 color sensor is used to sense the color with the help of photodiodes and then using a converter the photodiode readings are converted into a square wave which can be read with the help of microcontroller. The photodiodes are connected in parallel and with the help of the two control pins S2 and S3 we can select which of them will be read

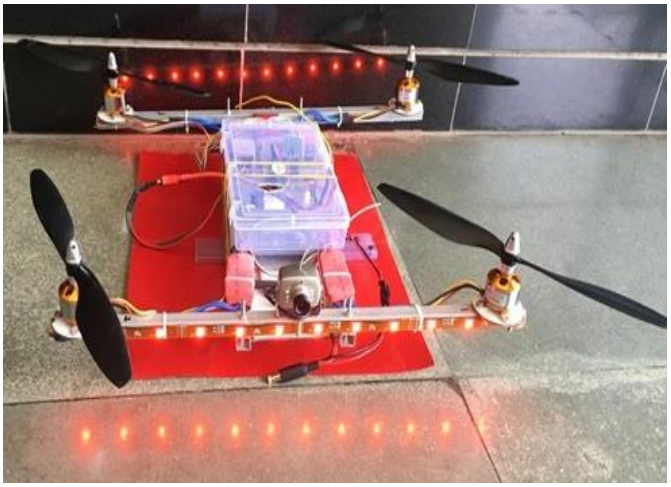
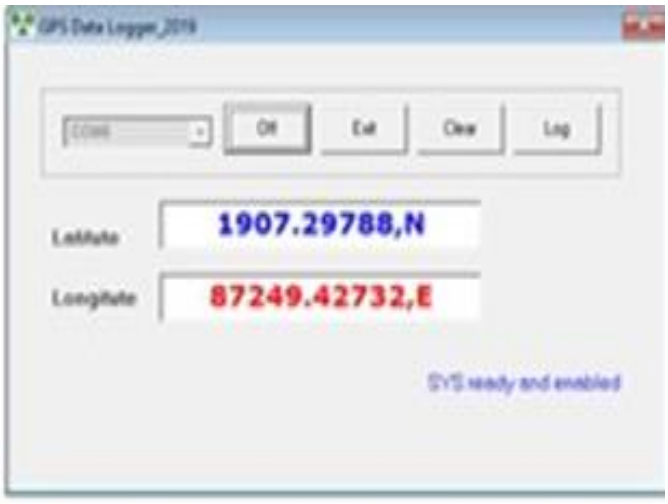


**Fig -3:** Color Sensor Output

With the help of frequency measurement, we can not only increase the resolution but also the accuracy and it provides with other benefits such as minimization of the jitter produced from the noise in the light signal. Resolution can be limited because of counter registers and measurement time. Frequency measurement can mainly be used for constant light levels over small intervals of time. Integration can also be used to measure the amount of light in an area which is called as a exposure.

### 5.3 GPS Tracking

The Global Positioning System (GPS) is a navigation system which comprises of Medium Earth Orbit satellite that transmit microwave signals and help the receivers to determine their location, direction and time. GPS is used for various purposes worldwide such as tracking, surveillance and scientific uses as well. The design comprises of the PIC16Fxxxx type advanced microcontroller.



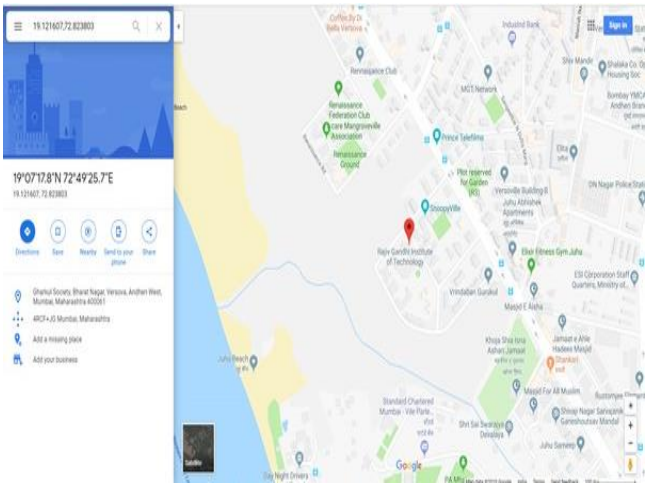




**Fig -3**: GPS Tracking Output

The GPS receiver consists of the active antenna which receives the RF signals and amplifies it. The GPS receiver calculates the position of the quadcopter with the help of satellites and the satellite sends the message comprising of the time, ephemeris and almanac. The signals travel at the speed of light and are received by the receiver. The receiver decodes the signal and measures the distance to each satellite. The GPS receiver also uses the knowledge that the receiver is on and estimates its position as the intersection of the sphere surfaces. The resulting coordinates are then converted into longitude, latitude and even plotted on the map

### 5.4 Camera


**Fig -4:** Camera Output

The camera module is used for the live video streaming of the enemy territory. A software installation process is necessary for the camera setup. For this we need execute the setup.exe installation file, choose the setup language and select the installation path. After the completion of the installation, open the software and use the USB Video capture to connect to the USB interface after which the pc will automatically install the driver. Once the setup the completed the video will be loaded successfully.

### 5.5 Circuit Diagram

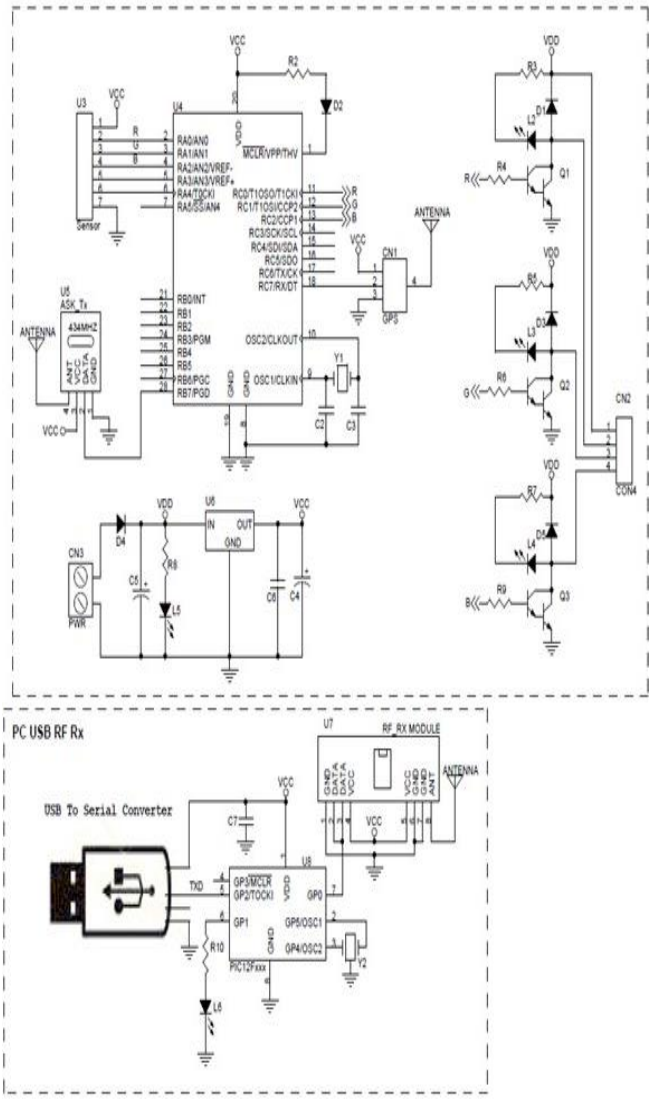



**Fig -5:** Circuit Diagram

**Table -1:** Component Specifications

| Sr. No. | Parts | Specification |
|---|---|---|
| 1. | ESC | 30A Continuous/35A Burst |
| 2. | GPS | High sensitivity -160dBm, +12V DC |
| 3. | BLDC motor | Current Capacity: 16A/60S, Maximum Watts(W): 180 |
| 4. | Microcontroller | Source Current: 25 mA, Wide operating voltage range: 2.0V to 5.5V |
| 5. | Flight Controller | Model: KK2.1.5, input voltage: 4.8V-6.0V |

## 6. CONCLUSION

This paper presents an innovative methodology and solution that enable a Quadcopter to detect the presence of enemies and help the military during war. Color changing mechanism has been implemented on the quadcopter using the color sensor along with the additional features such as GPS tracking and enemy detection using the night vision camera. The encoding used for the same is microprocessor encoding. The camouflaging of the drone with the background takes place by detecting the color of the surrounding and displaying the color on the LED strip which adds to the uniqueness of the concept. With the help of the GPS tracking system live co-ordinates of the drone can be send to the army which help them to detect the enemy and the night vision camera provides with the live recording of the field. This project is easily extendible and various features can be included inorder to make the drone robust and undetectable from the enemy.

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