IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 10, Issue 7, July 2021

DOI 10.17148/IJARCCE.2021.10794

Radio Controlled Surveillance System Using Drone

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Abstract: This paper describes the various benefits offered by drone for commercial as well as home purpose. Traditionally people uses remote to control the drone however it is very difficult to control and stabilize the drone and it may results into an accident. Sometimes drone undergoes into an unstable conditions which makes our drone uncontrollable. In this paper we have used GSM module to make our drone more stable and to set to co-ordinates. These upgrades to the basic drone will make more cost efficient in terms of maintenance. These upgrades probably make our experience more reliable and beneficial.

Keywords Drone, Raspberry Pi, GSM, Ultrasonic sensor and UAV.

I. INTRODUCTION

Drone is an aircraft without an on board pilot and its flight can be controlled either through pre-defined or autonomously using remote controlled computers. In today's scenario, drones are very important in military and civilian security services. At present security is a very big concern. The appropriate air surveillance support is necessary in situations like terrorist attacks and identifying crimes. Collision avoidance of the system will make it more reliable. If any kind of attack happens on our drone, the sonar sensor we are including in our drone will help our drone in avoidance of any accidental collision. Conventional CCTV cameras are used to monitor different activities for ssecurity purpose, however the cameras are fixed for the chosen route at fixed place and thus cannot cover large area. If we want to inspect a large space or location of a natural disaster site like Landslides, Tsunamis, Earthquakes and public events such as cconcert, and election rally, we cannot use fixed CCTV cameras. In these scenarios flying drone will help us to monitor real-time data and situations and helps to avoid any misshapen.

The existing systems don't have sonar sensors for avoiding any type of accident and a GSM module to make our drone more stable. In [1] author proposed first aid kit delivery drone for emergency situation. This will help drone to be more secure and efficient. Taking care of a drone through controller is really simple for specialists. However, not generally experts fly the drone. Assuming a non-master individual needs to fly the drone then it will be hard to deal with something similar. [2-5]. We are implementing co-ordinate system for that drone by which it will go to that place at its start and can be easily controlled by mobile remote. This drone will be easier to control by the use of sonar sensor. We are also including remote control option in our drone which can be reliable in critical situation like phone's battery dead or any other connectivity issue. Understanding this drone will be easier, adding extra sources of power or mechanisms to improve their payload capacity adds to the efficient cost of the manufacturing [6-9]. The proposed system is used to monitor the real-time situations using drone. Furthermore, the proposed system can be used for natural disaster monitoring such as earthquake, ttsunami, flooding and in military and civilian surveillance services.
The paper is organized as follows: Section 2 presents the proposed system design. Section 3 elaborate the result and Section 4 gives the conclusions.

II. PROPOSED SYSTEM DESIGN

The figure 1 shows the block diagram of the proposed system. It consists of blocks such as: GPS module, GPM module, BLDC motors, GSM module, camera, and ultrasonic sensor and Raspberry Pi module along with Arduino Uno. The function of each component is described as follows.

A. *Frame*: Quadcopter consist of a frame where we mount everything.

B. *Propellers*: Propellers are used for the movement of the quadcopter.

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C. Raspberry Pi 3B Module: All the controlling functions and data transmitting functions are done through this unit.

D. GPS Module: GPS module is used for tracking the quadcopter.

*E. Electronic speed control***:** ESC unit is used to control the working of BLDC motors.

*F. BLDC Motors***:** These motors are used for the movement of the quadcopter.

G. Flight controller: The flight controller uses the data gathered by the sensors to calculate the desired speed for each of the four BLDC motors.

H. Battery: It is used as a power source for quadcopter and all the circuitry.

I. Ultrasonic Sensors: It is used for the measurement of height of drone from the ground.

*J. Camera***:** Camera is used to capture the real-time images.

K. VNC viewer: It is used to ccontrol the Raspberry Pi from anywhere with VNC Connect remote access software.

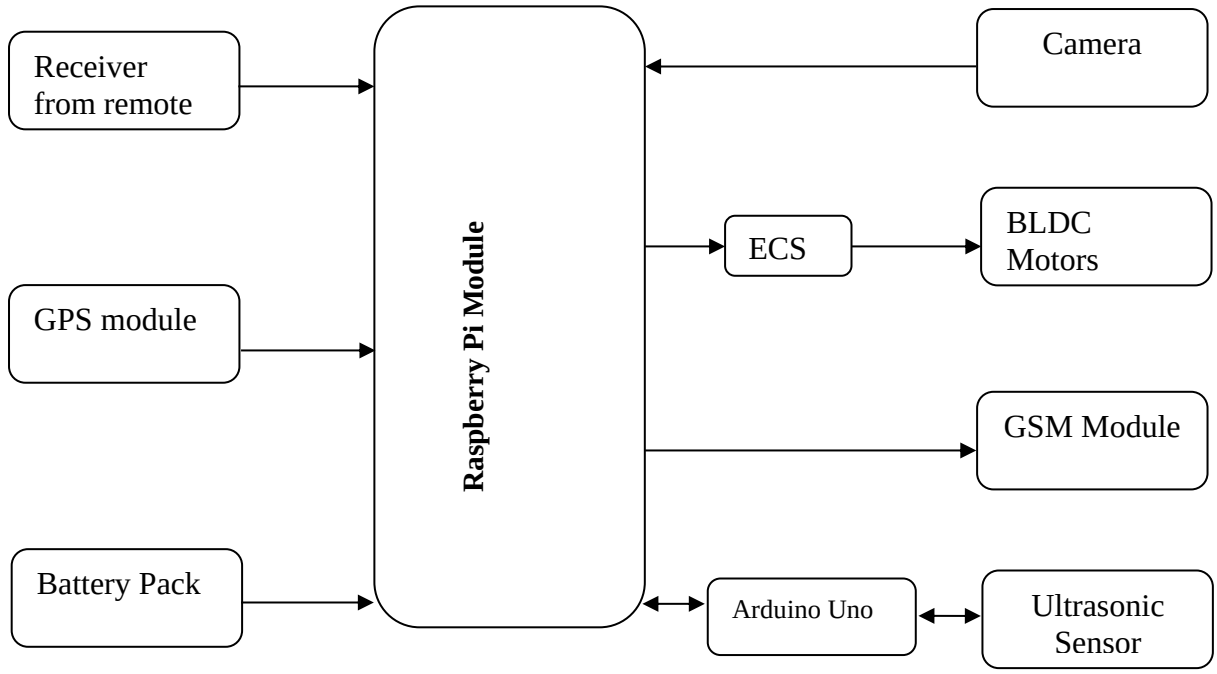

Fig. 1 Block diagram of the proposed system

The figure 2 shows the system flowchart. Initially, drone is configured to required co-ordinates along with the height parameter. The drone will turn-on all the propellers. If all the systems are good, the drone will send the real-time data through the GSM module to the remote computer.

III. RESULT AND DISCUSSIONS

The figure 3 shows the flowchart of camera module using Proteus simulation software. Here, camera will send the captured footages and send to mobile phone for analysis. The figure 4 shows the flowchart of GPS module using Proteus simulation software. Here, GPS module will provide the co-ordinates such as latitude and longitude to Raspberry Pi which will further sent back on mobile phone.

The results shows that the camera and GPS module are able to send us the appropriate location and live footages. Camera is also working well with Raspberry Pi. It will have its own display where we can easily see all the things happening. Sonar sensors are able to avoid collision and make our drone safer in terms of accidental collision. Electronic Speed Controller can make our easily collaborate with Sonar Sensor. Ultrasonic sensor is also working well when it is detecting any sort of obstacle. It is sending commands to raspberry pi to stop that drone from moving forward. The figure 5 shows the simulation of camera module and GPS module using Proteus simulation software. Further, the figure 6 shows the simulation of Ultrasonic Sensor and BLDC motors using Proteus simulation software**.**

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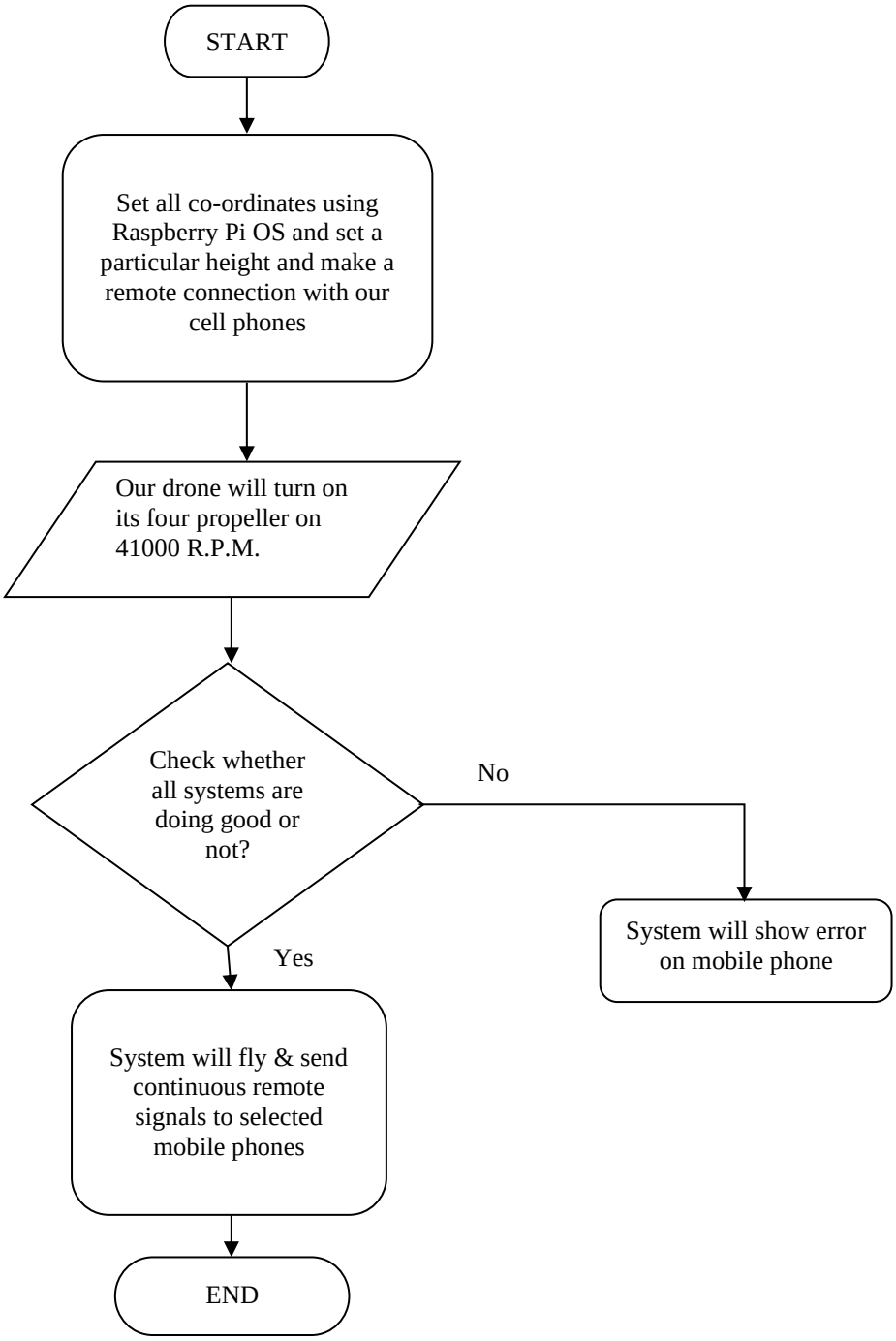

Fig. 2 System flowchart

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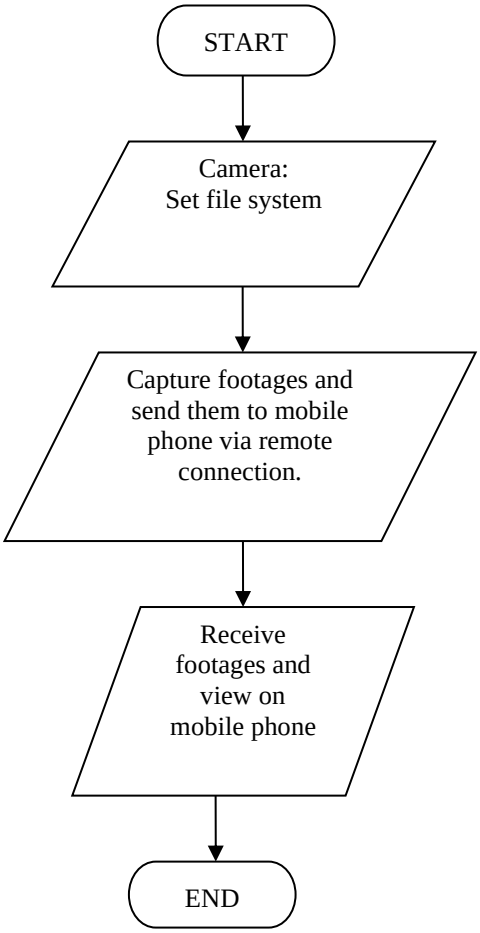

Fig. 3 Flowchart of camera module using Proteus simulation software

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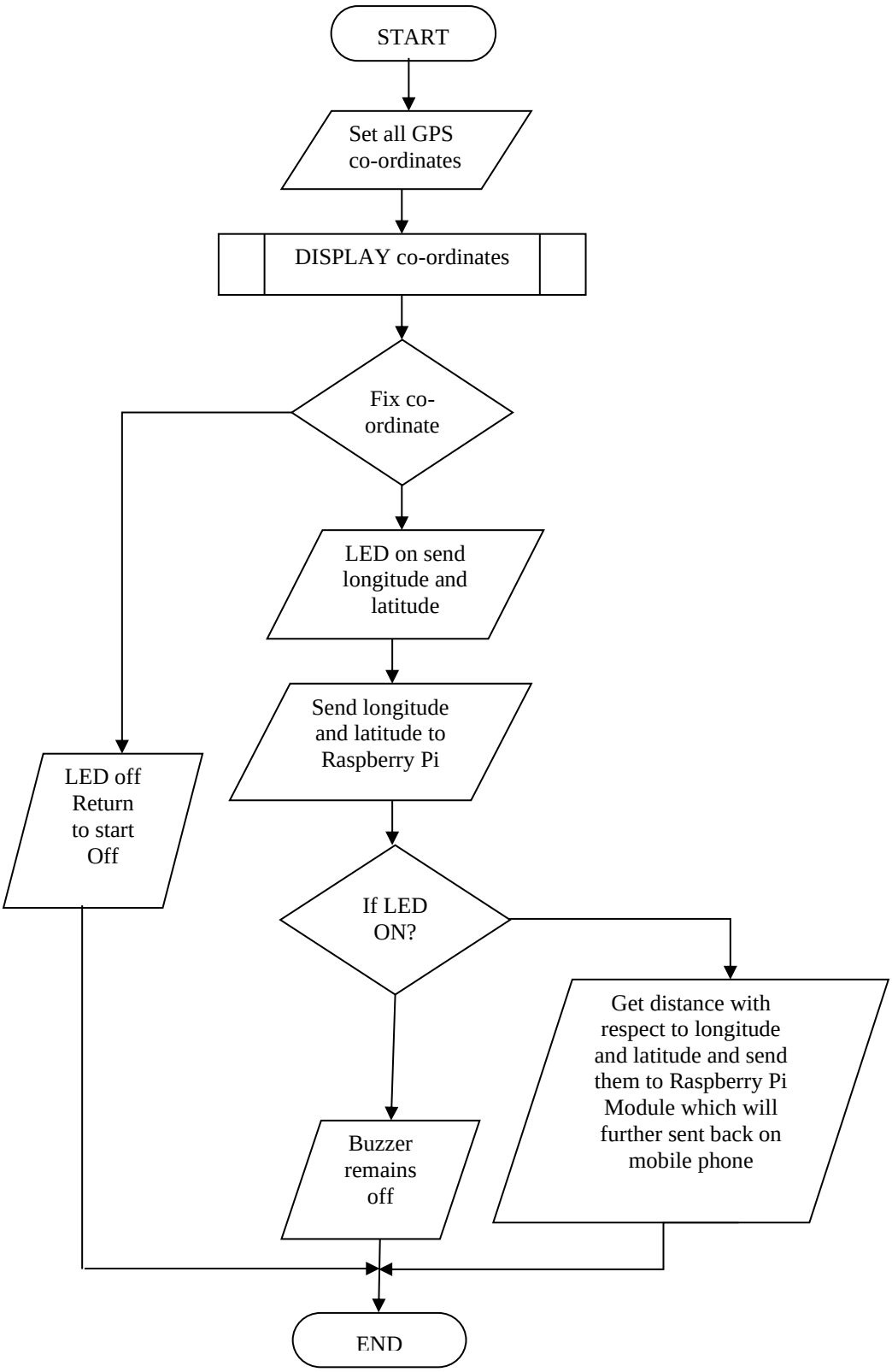

Fig. 4 Flowchart of GPS module using Proteus simulation software

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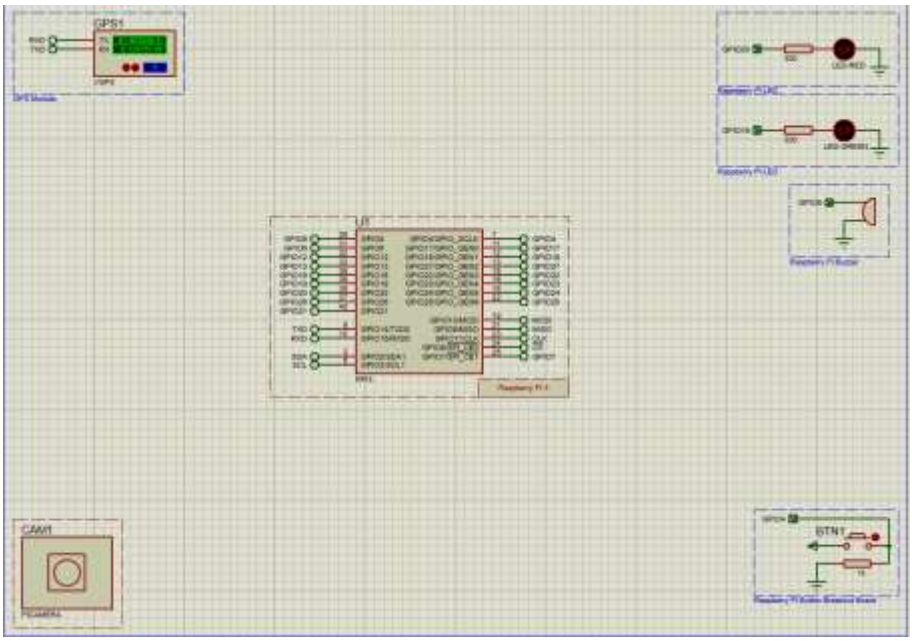

Fig. 5 simulation of camera and GPS module using Proteus simulation software

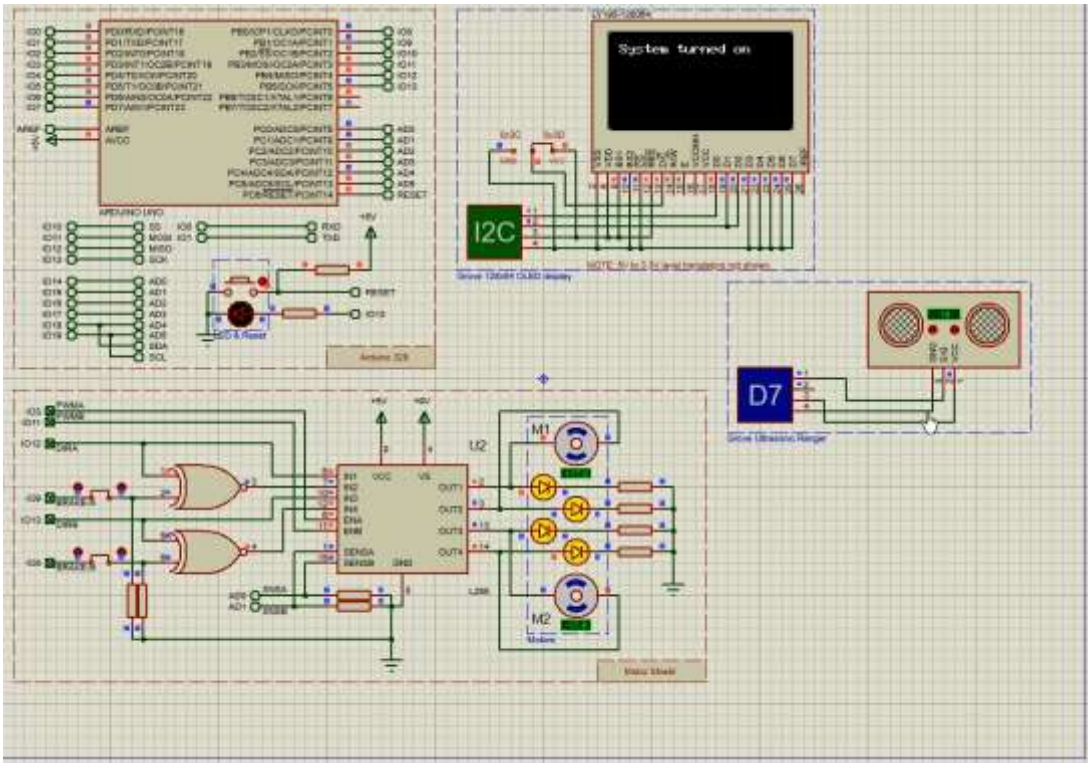

Fig. 6 Simulation of Ultrasonic Sensor and BLDC motors using Proteus simulation software

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IV. CONCLUSION AND FUTURE SCOPE

This drone will be very helpful in different kind of essential and emergency surveillance which will detect obstacle, able to send live camera footages and have more stability. This work will also be helpful in essential services. If we consider about today's pandemic situation, we all get one similar thought about do not touch to anything. Before pandemic there was one sentence we all people heard that "Do not touch to any suspicious object" but now a days travelling outside of home or surveillance within our particular shop is somewhat difficult.

The use of drone will increase the work efficiency and productivity, decreasing workload and production costs, improving accuracy, refining service and customer relations, and resolving security issues on a vast scale. The drones are now popular in both the commercial and non-profits sectors. Their uses will be even more common in the near future. Drones are useful for Retail, Transportation, Entertainment, Agriculture, Search and rescue, Home security, Construction etc.

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BIOGRAPHY

Yuvraj V. Parkale received a Ph.D. degree in Electronics and Telecommunication Engineering from Government College Dr. Babasaheb Ambedkar Technological University (DBATU), Lonere, Raigad, Maharashtra, India in 2019. He is the author of more than 25 articles published in International/National Journals and conferences. He has delivered expert lectures on Compressed Sensing and several other topics in signal processing and embedded systems. He has also worked as an Editorial board member for International and national journals and conferences. His current research interests include compressed sensing (CS), optimization techniques and algorithms, signal processing, embedded systems, internet of things, and machine learning. Dr. Yuvraj V. Parkale is a member of the Indian Society for Technical Education (ISTE) and IEEE Signal processing society.

Onkar Hiremath is a student of B. E. Electronics and Telecommunication Engineering department at SVPM'S College of Engineering, Malegaon (Bk). His interest areas are embedded system, internet of things, computer software and hardware, and python programming etc.