

DRONE VOLTAGE TESTER

¹Athul Babu A, ²Jesna S, ³Rahul Jayaprakash, ⁴Sumin Kumar S, ⁵Dhanya C S

^{1,2,3,4}Engineering Students, ⁵Assistant Professor
^{1,2,3,4,5}Dept. Of Electrical and Electronics Engineering
^{1,2,3,4,5}UKF College of Engineering and Technology

Abstract: The purpose of this article is to develop a UAV equipped with the modern technology used for automatic voltage detection in HV lines. In this paper we proposed a method for designing a quad-copter to indicate the occurrence of voltage in HV lines. We use an voltcheck module, which is about the drone at find the existence of voltage. The existing high voltage checking systems are heavily danger and are harder at high altitude places. So our proposed system can reduce the manpower involved and ensure safety to the users also can use at remote area well.

Index Terms – Quadcopter, Voltcheck.

I. INTRODUCTION

Quadcopter is a ground-breaking invention with regard to unmanned aerial vehicles (UAV). Because of their design simplicity, tiny size, easy maintenance and affordable cost they are vastly used for entertainment, search or monitor and rescue activities. But the field where it may be utilized in a dynamic way is security systems. Fault sensing and maintenance in electric lines is always a dangerous work. By implementing our proposal plan, we can easily make a solution to many of such problems. For maintenance purpose in high voltage line it is essential to the present of voltage. Which is always produced with the assistance of a meter connected on a stick, hold by a man. It is a very risky work. To overcome such an issue drone connected with a voltcheck (high voltage checking instrument) is used. And it can be operated manually by man on the ground. This makes the man safe.

This paper is structured as follows. In Section II the past research that has been done with quadcopters over last few decades are discussed. The organization steps of our offer model are stated in Section III and the mechanical parts that we used while Designing our model is described in Section IV. The detailed working process of our proposed model is presented in Section V. Results of successful flight tests with additional features are discussed in Section VI followed by discussion and conclusion in Section VII.

II. METHODOLOGY

The prefix quadcopter implies a drone configuration wherever there are eight arms. The most frames are created of carbon fiber material with every arm length of 492 mm. At each free finish of the arm, a motor are mounted and mechanical device will be automatically coupled to the motor. For all four motors the output aspect of Associate in Nursing ESC are going to be connected and also the input side of the Electronic Speed Controller (ESC) will be connected to the flight controller. The opposite input of the ESC will be connected to the facility distribution board wherever the power offer is provided by the Li-Po battery. during a similar fashion all the other ESCs, motors and propellers are connected. A receiver will be connected to the Flight controller to receive signals from the transmitter. The voltage-detecting instrument, voltcheck is placed on the centre of the drone. This is fixed just above the flight control board.

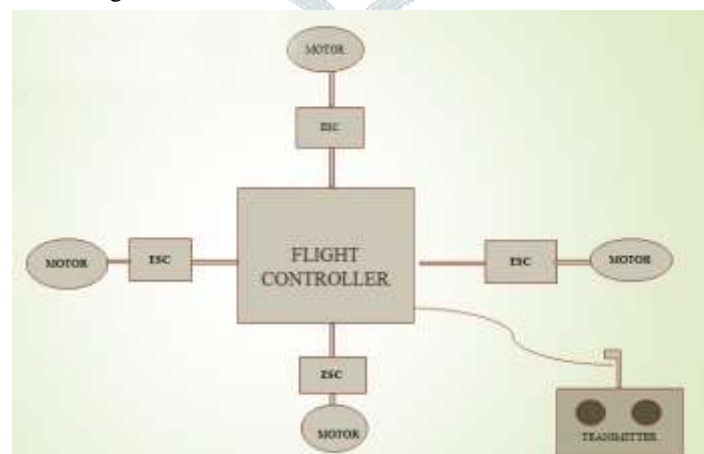


Fig 1 Block diagram

Wi-Fi is used to display the information to the farmers. These devices are having an influence on reducing costs and reduce the time. This system consists of two solenoid valve (2-way and 3-way) 2-way is used for moisture sensor and 3-way is used for pH sensor and last thing is LCD display finally the output of the sensors are shown in LCD display and data sense to user through Wi-Fi.

III. PROPOSED SYSTEM

Our study is the extension of the existing system as we are using the latest IOT technology, which helps in collecting information about condition like moisture and pH of the soil, of the field. Sensors like moisture, pH are used for the detection of the plant condition and here node MCU are used to control and automate the farm processing. Here GSM module is used to control and automate the farming processing. GSM module is used for sending and receiving the updated message through smart phones to the farmers with the ongoing condition of his agriculture land using IOT at any time and any part of the world.

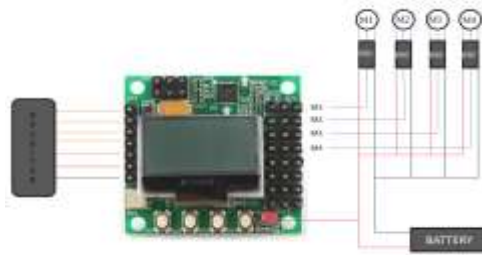


Fig 2 proposed system

The signals will be transmitted from Transmitter and the Receiver in the drone will receive it. From the receiver the signal goes to the Flight controller wherever the signal are processed with measuring system and rotating mechanism sensors. The processed signal will be sent to the ESC, that permits the precise quantity of current to the motor supported the signal it receives. The propellers are automatically coupled to the motors in order that they rotate and turn out thrust. With the help of the remote controller user can fly the drone near to the extension lines. The LED indication and buzzer provided in the voltcheck is used to find out the presence of voltage.

IV. HARDWARE USED

This project consists of many hardware components. This proposed system helps to enable the study of different types of electronic equipment's. This system helps the workers

4.1 Motor

Outer runner BLDC motors in which there are no brushes, they have a permanent magnet. The RPM of the motor can be controlled by varying the input current. RPM can be calculated in this way; $RPM = K_v \times V$.

This MOTOR EMAXb1 2815/09, 1000KV, 450 watt out run brushless motor can produce thrust of 1550gram.



Fig 3 Motor

4.2 Propeller

Propellers are mounted on each of the BLDC motor. The propeller is of twenty four inches length and has 7.2 inches pitch. It is created from carbon fiber that possesses high strength to weight quantitative relation when put next to the propellers made up of plastics.



Fig 4 Propeller

4.3 ESC

It stands for Electronic speed controller and used for to control electrical model to change its motor's speed and direction. ESC generates three high frequency signals, with different but controllable phase, continuously to keep the motor turning. 60A ESC is used for each motor.



Fig 5 ESC

4.4 Battery

The battery that can be used is a Li-Po battery of 3300mAh capacity with 11.1V .use 3cells for to give high amount of current to BDLC motor. It can provide nearly about 3A current constantly.



Fig 6 Battery

4.5 Flight Controller

Kk2.1.5 Multi rotor control board to control the drone.it provides auto level function .the feature of this flight controller board are much easier for calibration. The accelerometer and gyroscope sensors in the flight controller process the signal and give the output to the ESC. It use 8 bit ATMEL Mega 644P microcontroller with 64k of memory.



Fig 7 Flight Controller

4.6 Receiver & Transmitter

The transmitter and receiver used are flysky CT6B 2.4Ghz 6CH and FS-R6B respectively. This device helps control flight system of our drone. The first four channels are generally used for flight controls and last two for other operations. It covers range about 1kilometer and 1200meter it get low signals



Fig 8 Receiver & Transmitter

4.6 Voltcheck

The VOLT CHEK is a variable non-contact voltage detector. A proximity device which detects the presence of associate degree alternating electrical or magnetic attraction field. It is employed by trade professionals for live /dead voltage determination of outside overhead /underground at Norn checkpoints. This only equipment capable of testing all voltages from ac 415V to765 V from a distance, beyond arcing zone.



Fig 9 Voltcheck

V. RESULTS AND DISCUSSION

The BLDC motor drive circuit with closed loop control system is presented with the help of SIMULINK blocks. The complete system is derived a six step inverter fed BLDC motor where two control loops are used. The outer loop regulate the motor’s speed and PI controller used to get a steady output.

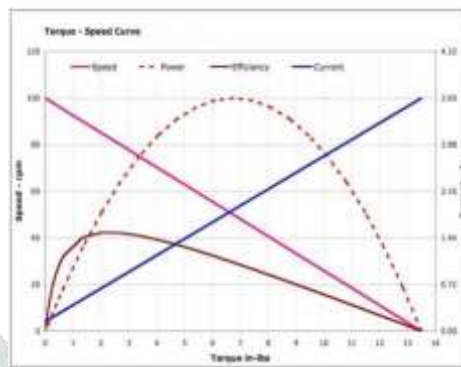


Fig 11 simulation result of motor

Motors can be described using a graph called a torque speed curve. This most commonly desired piece of information for motors. The first observation to make from a torque-speed curve is that speed decreases as torque increases, when apply a voltage to it. The corresponding speed is low speed and it’s the fastest the motor with spin at the voltage. And power efficiency curve included. Power produced by a motor is mechanical power that means the lifting power of the quadcopter. It is equal to the product of its speed and torque efficient motor would produce as much mechanical power as electric power as consume. The point on the torque speed curve defines a motor performance. This is an important term to understand the operating point will also change with change in weight.

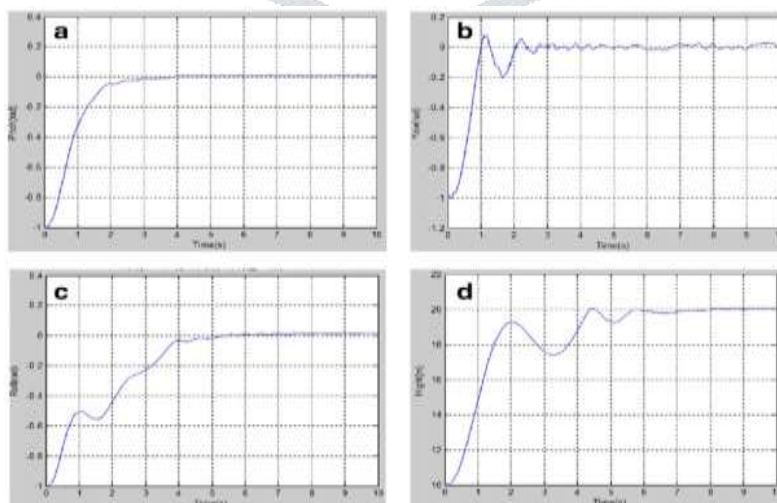


Fig 11 simulation results of motion

Quad rotor simulator was used to check the validity of the dynamic model of the quad copter and simulate control algorithms. Compare the outputs of our, model with the MATLAB. The simulated controller was tuned with the values used in actual platform. Results comparison of roll, yaws, pitch and throttle respectively. The input signals to the drone and the actual orientation data of the drone were recorded on a test flight and actual input was used to obtain simulated results. Comparison between the outputs of roll movement, pitch movement, yaw movement, and throttle

movement are shown in fig. respectively.

VI. CONCLUSION

Main aim of the proposed model was to develop drone with volt check on payload. Circuits are risky and deadly via loss of warning or negative protection practice. The drone high voltage tester has been designed with protection in mind.

Quadcopter can be easily designed and assembled by using above components. Thus, before designing the final prototype we individually tested all components, so that additional cost due to flight test damage can be avoided. Our model provided desired service with minimal cost.

REFERENCES

- [1] Venkata Subba Rao P, Srinivasa Rao Gorantlla, “ Design and Modeling Of an Affordable UAV based pesticides Sprayer in Agriculture Applications”.2019.IEEE.
- [2] Preliminary study on unmanned aerial vehicle quad copter using PID controller. Muhammed Arifudin Lukmans; Hendro nurhadi; IEEE conference paper.
- [3] Extension of quad copter flight range based on quad copter transport system and autonomous ramp flight algorithm; Cheonghwa Lee; Sangwoong Lee;IEEE2020 (journal article).
- [4] Morphing Quad copters: A Comparison Between Proposed and Prominent Foldable Quad copters.Thanat Tothong;James Samawi;Ameya Govalkar;Kiran George2020 11th IEEE Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)Year: 2020 | Conference Paper.

