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Survey and Depth Analysis of Shallow Pit Using Quadcopter

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ABSTRACT: In recent years all industries were using Drones for various applications mainly for surveying, to reduce man power and time. A quadcopter is developed to help land surveyors by replacing mechanical instrument with sensors, by using this time is reduced comparatively in large scale and manual error In data collection also eliminated and as the data obtained is in digital for it is very effective and time efficient while manipulating the field data .

KEYWORDS: Quadcopter, Survey, Sensors,

I. INTRODUCTION

In this modern age of technology, quad copter has become one of the most popular inventions in the field of science. A quad copter, also known as UAV (Unmanned Aerial Vehicle) uses four Propellers for lift and stabilization. The rotors are directed upwards and they are placed in a square Formation with equal distance from the center of mass of the quad copter. The quad copter is controlled by adjusting the angular velocities of the rotors which are spun by electric motors. Now-a-days, Quad copters have received considerable attention from researchers as the complex phenomena of the Quad copter has generated several areas.

Here, Quad copter developed for survey purpose. Mainly, In this project we measure a volume of a shallow by calculating latitude and longitude of a shallow in various points. For this process we are using quadcopter along with ultrasonic sensor and Gps.

The basic concept of flight mechanism is as follows:

- YAW (turning left and right) is controlled by turning up the speed of the regular rotating motors and taking away power from the counter rotating; by taking away the same amount that you put in on the regular rotors produces no extra lift (it won't go higher) but since the counter torque is now less, the quad copter rotates.
- ROLL (tilting left and right) is controlled by increasing speed on one motor and lowering on the opposite one.
- PITCH (moving up and down, similar to nodding) is controlled the same way as roll but using the second set of motors. This may be confusing but roll and pitch are determined from where the "front" of the drone is. To roll or pitch, one rotor's thrust is decreased and the opposite rotor's thrust is increased by the same amount. This causes the quadcopter to tilt. When the quadcopter tilts, the force vector is split into a horizontal component and a vertical component.

A. Atmel Atmega 328p

The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed InSystem through an SPI serial interface, by a conventional nonvolatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. ATmega328/P is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications. The ATmega328/P AVR is supported with a full suite of program and system development tools including:



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C Compilers,
Macro Assemblers,
Program Debugger/Simulators,
In-Circuit Emulators and Evaluation kits.

II. ARDUINO UNO

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output -activating a motor, turning on an LED, publishing something online. Arduino IDE (Integrated Development Environment) is use to upload programs to the arduino Boards and these microcontroller boards can be used to perform intended tasks.

III. BLDC MOTOR

A typical brushless motor has permanent magnets which rotate around a fixed armature, eliminating problems associated with connecting current to the moving armature. Brushless motors offer several advantages over brushed DC motors, including high torque to weight ratio, more torque per watt(increased efficiency), increased reliability, reduced noise, longer lifetime (no brush and commutator erosion), elimination of ionizing sparks from the commutator, and overall reduction of electromagnetic interference(EMI). With no windings on the rotor, they are not subjected to centrifugal forces, and because the windings are supported by the housing, they can be cooled by conduction, requiring no airflow inside the motor for cooling. BLDC motors are rated in KV where it rotates 1000 rpm per 1 Volt supplied to it if its rating is 1 KV

IV. ELECTRONIC SPEED CONTROL

Four 30A ESCs (electronic speed controllers) are used in proposed Quadcopter, it's used to control the voltage applied to the BLDC motor as per the PWM signals it receives from Microcontroller digital pins. As we are using 30A ESC so the maximum current it can handle is 23A.The function of electronic speed controller for brushless motor:

1. Reset to factory default
2. Battery types set (LiPo or NiMh/NiCd)
3. Brake set (yes/no)
4. Threshold set of protection for low voltage (set a protective value for low voltage)
5. Motor entrance angle set (improve the service efficiency of ESC and the stability in the starting)
6. Accelerated start-up set (used in precise gear box and application of helicopter)
7. Helicopter mode (used in application of helicopter)
8. Steering motor (clockwise/anticlockwise)
9. Operating frequency set
10. Protection mode under low voltage (reduces power or halts immediately)

V. LiPo BATTERY AND CHARGER

The main use of LiPo battery over here is that it provides large current required for operating the BLDC motors. We are using 2200mAh LiPo battery of 30C-40C discharging rate of 11.1V (3S), this indicates that when 3000mA load is placed across it then it will take 1 hour to discharger completely. 11.1 Volt LiPo battery can be 100% charged when it's charged up to 12.6 Volt. The charger as shown in the above picture is used as a 3 cell charger specially for LiPo battery.

I. QUADCOPTER FRAME:

The F-450 quad copter frame is used as it's suitable for the propellers and the payloads which have to be lifted

II. PROPELLERS:

10x4.5 Propellers Black CW CCW 4 pieces. We have used these as per the requirements



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III. 6-CHANNEL TRANSMITTER-RECEIVER:

The 6 channel tx/rx are used to control the Quadcopter by using only first four channel of it. The remaining two channels can be used to control the modules attached to it.

IV. GYROSCOPE:

The L3G4200DH gyroscope is a low-power three-axis angular rate sensor. It includes a sensing element and an IC interface able to provide the measured angular rate to the external world through digital interface (I2C/SPI).

V. QUADCOPTER MOVEMENT:

The thrust and torque are the very basic two things used for movement of quadcopter. The movement are decided on the input values(x, y, z, θ , ϕ , ψ) provided to it. The movements are:

A. Yaw Rotation

Each of rotors on the device produces both thrust and torque. Initially there are front-left and rear-right motors both rotate counter clockwise and other two rotate clockwise, the net aerodynamic torque will be zero. Yaw decides the direction of the quadcopter

B. Roll Rotation

Motion of the Quadcopter about the longitudinal axis is called as roll. It makes Quadcopter to fly either right or left.

C. Pitch Rotation

VI. CONCLUSION

In this paper, Quad copter is developed with ultrasonic sensor and GPS chip is used to find the location of drone and distance interval by which the sensor collects the field data

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REFERENCES

1. Disha Amrutlal, Munmun Ghosal: "Novel Low Cost Quadcopter for Surveillance Applications". International Conference on Inventive research in Computing Applications (ICIRCA) 2018
2. Aditya Khavnekar, Jinil Gondalia, Dhruv Shah: "Low-Cost arduino based architecture for simulation and control of quadrotors". International Conference On Inventive Systems and Control(ICISC) 2017
3. Yohanes Gunawan Yusuf , Hendi Wicaksono Agung : "Optimizing ultrasonic and barometric sensors for quadcopter's altitude-hold using YoHe V1.2 PID and KK V2.0 boards". International Seminar on Sensors, Instrumentation, Measurement and Metrology (ISSIMM)
4. VNV Aditya Sharma, M Rajesh : "Building a quadcopter: An approach for an autonomous Quadcopter". International Conference on Advances in Computing, Communications and Informatics (ICACCI) 2018