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MultiWii based Follow me Drone with Camera

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***Abstract*—**Drones are very popular toys and tools thesedays . This drone uses Multi Wii 32kB flight controller that is based on the ATMega328 chip used in the Arduino UNO . This drone can be connected to an Android smartphone that sends its GPS data to the drone, that compares to its own GPS signal, then starts to follow phone, so if I move on the street the drone follows me , that means that it follows the phone, makes a videoand also has a Ultrasonic distance sensor to avoid the obstacles in the air . The ultrasonic sensor helps to bypass trees, buildings and other obstacles and the GPS gives a very accurate position data.

Keywords*—Multi Wii 32kB flight Controller , Ultrasonic Sensor, GPS Module.*

INTRODUCTION

Drones have become increasingly popular in recent yearsfor a variety of applications, including aerial photography, surveying, and search and rescue operations. One of the mostexciting features of drones is their ability to autonomously follow a target, allowing for unique and dynamic footage. Inthis project, we will build a DIY smart follow-me drone witha camera, which can autonomously track a target and capturehigh-quality photos and videos from the air.

To achieve this goal, we will use a Raspberry Pi as the brain of the drone, connected to a camera module and a GPSmodule. We will use computer vision techniques to detect and track the target, and GPS to follow it autonomously. Thedrone will also be equipped with obstacle avoidance sensors to ensure its safe flight[1].

The camera on the drone will capture high-quality photosand videos from the air, providing a unique and exciting perspective. With the ability to transmit a live video feed to amobile device or computer, the user can monitor the drone's flight and view the captured media in real-time[2].

Building a DIY smart follow-me drone with a camera is achallenging but rewarding project. It provides an excellent opportunity to learn about computer vision, GPS, and drone technology. It is also a fun and exciting way to explore the possibilities of aerial photography and videography.Drone applications in several industries have been increasingly prominent today. Its benefits are superior to thatof any traditional methods of gathering data[2]. With this technological advancement, modern solutions are being well–incorporated, whether for commercial, industrial.

Due to their availability and cost-efficiency, drones usually have CMOS cameras that allow extensive video and photo frame rates. A drone with a camera for adults in various industries may appeal to CMOS camera integration as it has an enhanced dynamic spectrum and operates in lesser voltage[3]. With that, drones have longer flight times and may not require recharging often.

EXISTING METHOD

The Security is done manually before the introduction of Drones. In Existing method, Drone was invented but they are not suitable for Security and Surveillance purposes.

PROPOSED METHOD

The Proposed of this Drone is to connected to an Androidsmartphone that sends its GPS data to the drone, that compares to its own GPS signal, then starts to follow phone, so if I move on the street the drone follows me[1]. Of coursehas many failings yet, because I wasn't able to make a professional

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filming drone, but follows the phone, makes a video and also has a ultrasonic distance sensor to avoid the obstacles in the air[2]. I think this is pretty much features from a homemade drone. As soon as possible I will load up avideo about a flight, but it is hard to make good quality records with an always moving drone.

Fig: 1. Security through manually

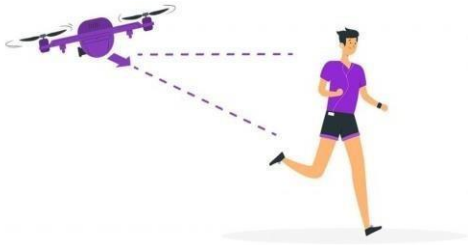
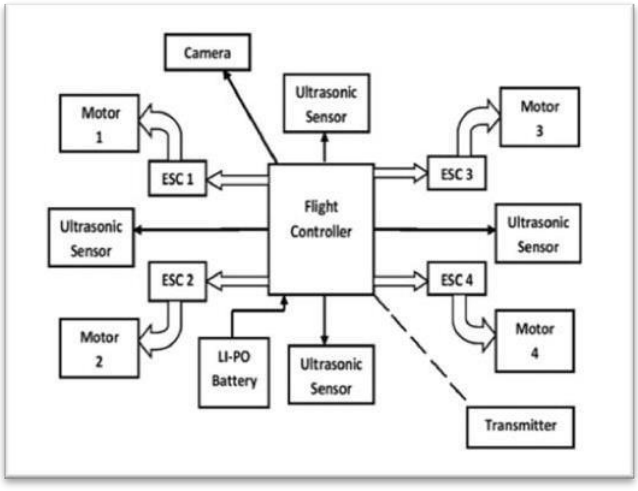


Fig: 2. Drone Follow a Person

BLOCK DIAGRAM



MAIN PROPERTIES:

STEP 1:

The drone is almost fully automatically, you don't have to control it, because follows your phone that is usually in yourbike, The ultrasonic sensor helps to bypass trees, buildings and other obstacles and the GPS gives a very accurate position data, but let's see what do we have in total[1]:

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- **1200mAh battery, enough for 16-18 minutes ofcontinuous flying**
- **ultrasonic sensor to avoid obstacles in the air**
- **WIFI module to receive data from the phone**
- **Arduino based microcontroller**
- **build-in gyroscope**
- **regulated maximum height (5 meters)**
- **when battery is low automatically lands on thephone (hopefully in your hands)**
- **with the help of the GPS you can send the droneto any coordinates**
- **quadcopter designing**
- **equipped with a 2MP 720p HQ video camera**

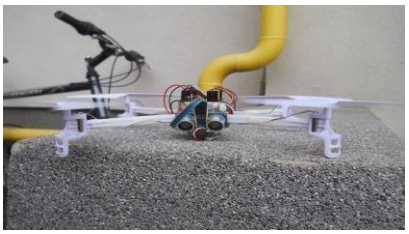

Fig: 4. Drone setup

So that is all that the first version can do, of course I want to develop it. During the summer I want to hack my bigger drone with this software[2].

STEP 2:FLIGHT TEST

I asked two good friends of me to walk in the front of the drone, while I was under the drone, to save it if falls down. But the test succeeded, and as you can see the drone still is not very stable, but worked. The left guy in a yellow T-shirt held the phone, that transmitted the GPS data. The video quality with this camera is not the best, but I didn't find low weight 1080p cameras.

STEP 3:GATHERING PARTS AND TOOLS

For this project you need some new and unusual parts. I designed from low weight and recycled parts to reduce the cost, and succeeded I got very good materials for the frame. But let's see what we need! I bought the Crius brand of the flight controller from Amazon.com and worked

1) ***Tools:***

- **Soldering Iron**
- **Glue Gun**
- **Cutter**
- **Wire Cutter**
- **Rotary Tool**
- **Super Glue**
- **Rubber band**

2) ***Parts:***

- Multi Wii 32kB Flight Controller
- Serial GPS Module
- WIFI Module
- Ultrasonic Sensor
- Plastic Piece

- Motors
- Propellers
- Screws
- L293D Motor Driver (it was a bad choice, I willcorrect in the second version)
- 1000mAh Lithium Ion Battery

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STEP 4: ASSEMBLE THE PROPELLERS

I bought these propellers with motors from the Amazon, they are spare parts for the drone, but they seemed useful so Iordered them, and worked fine[3]. You just have to put the motor in its hole, and attach the props to the gearing.

Fig: 5. Propellers Assembling to the motors

STEP 5: SOLDERING MOTOR TO DRIVER

Now you have to solder all cables from the motors to the L293D motor driver IC. Look at the pictures, they say much more, you have to connect black and blue wires to the GND and positive wires to the Outputs 1-4, just like me. The L293D can drive these motors, but I recommend to use some power transistors because this chip cannot handle all the four motors at high power (more than 2 Ampers). After this cut 15 cm straws these will hold the motors in place[1]. I used extra strong straws that I got from a local bakery and cafe. Put these straws gently on the Motors's gearings.

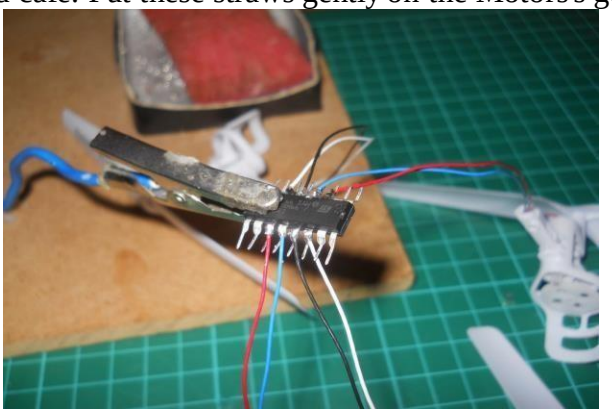

Fig: 6. Soldering wires to the L293D

STEP 6:ASSEMBLING THE FRAME

Please pain attention on the second picture, that shows how equip the propellers . Use some hot glue and super glue to suit all four propellers then check the connections[4]. It is very important that the propellers have to be by the same distance from each other.

Fig: 7. Drone's Frame Assembling

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STEP 7:ADD WIRES TO THE L293D

Take four female-female jumper wires and cut the in half. Then solder them to remaining pins of the IC. This will helpto connect the pins to the Arduino's I/O pins. Now it is timeto build the circuit.

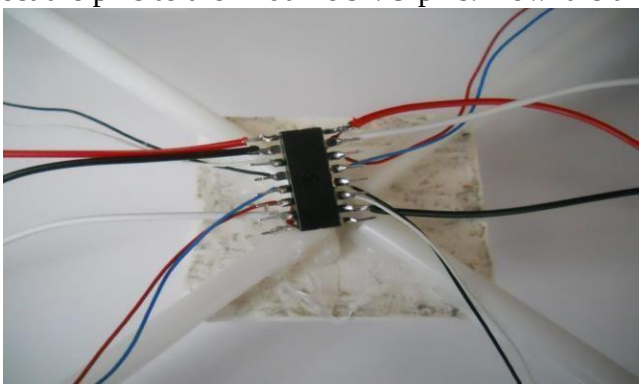

Fig: 8. Connecting wires to the L293D

STEP 8:THE CIRCUIT

All modules are included with the flight controller kit that Iordered, so you just have to connect them together. The Bluetooth goes to the Serial port, the GPS first in the I2C converter then in the I2C port. Now you can equip this on your drone.

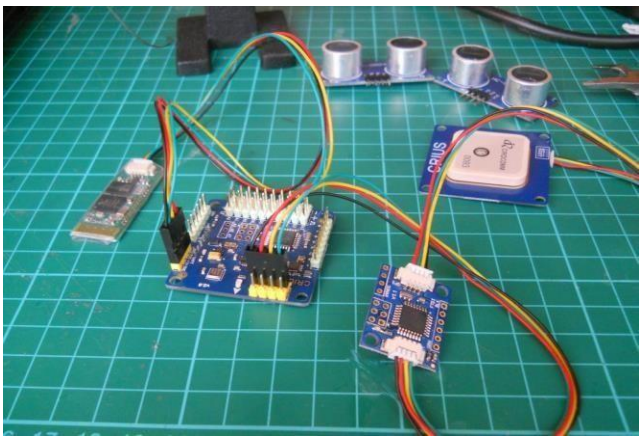

Fig: 9. Drone's Circuit setup

STEP 9: PUTTING THE CIRCUIT ON THE FRAME

Use some double sided tape and add the GPS first. This sponge-tape holds everything in place, so glue every moduleone by one on the plastic piece. If you're done with this you can connect the motor driver's pins to the Multi Wii.

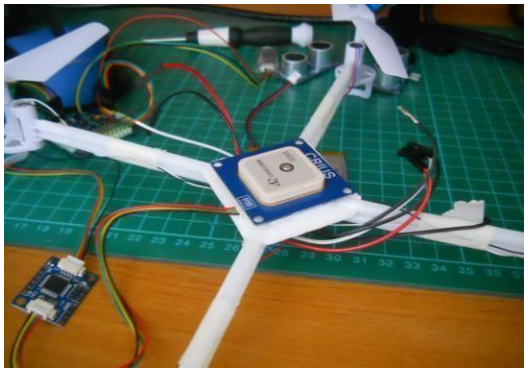

Fig: 10. Adding the Drone Circuit on to the Frame

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STEP 10:THE UTLRASONIC SENSOR

The sonar sensor is fixed on the drone with a Rubber band,and connected to the D7 and D6 pins of the Multi Wii controller.

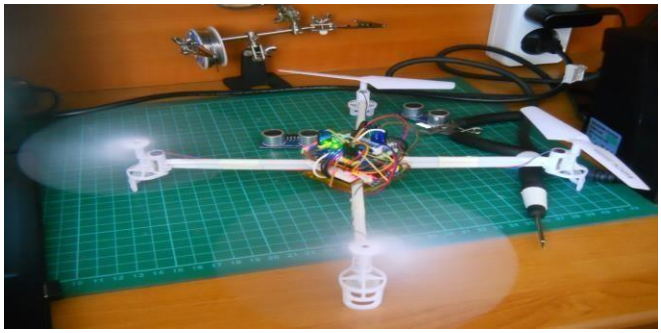

Fig: 11.Placing Ultrasonic sensor to the MultiWiiController

STEP 11:HOW A GPS WORKS..

The Global Positioning System (GPS) is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides criticalcapabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver[2]. GPS modules typically put out a series of standard strings of information, under something called the National Marine Electronics Association (NMEA) protocol. More information on NMEAstandard data strings can be found at this site.

STEP 12: PHONE APP

I used the HFUN app that can be downloaded from here **https://play.google.com/store/apps/details?id=com.h8** to your Smartphone. Connect to the drone via WIFI Module and turn on the GPS TX and data logging. Now the phone app is ready.

STEP 13: TESTING

The drone is still instable because is not a professional project, but works fine[4]. I am very happy with the results. The connection distance was about 8 meters that is more than enough for a drone like this. The video is coming soon and I hope you'll like it. It is not a racing drone, but it's also pretty fast.

Fig: 12.Testing the Drone Working

USING THE TEMPLATE

After the text edit has been completed, the paper is ready forthe template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file[2]. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

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CONCLUSION

This project is for inventing the Arduino based flight control system, Ultrasonic effective sensors with Camera are also being included that it follows people[3] . The effective changes in hardware and software can give high stability in UAV system.

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