Intelligent Quadcopter

Sagar Jaiswar, Pranav Pai, Disha Kamble
(jaiswarsagar10@gmail.com , pranavp199857@gmail.com , k.disha12@gmail.com)

Department of Electronics and Telecommunication Engineering
Rajiv Gandhi Institute of Technology, Andheri (W)

Abstract— In some cases, like if an apartment or a building is on fire, we know that some people get stuck in some rooms and due to fire they can't find a way to come out of it. Also, it is a difficult task for a rescue force to rescue such hostages. Same condition goes for the hostages stuck in rocks while Earthquake occurs. It takes some time for a Rescue force to search for such people. So, in order to help the rescue force to find these people stuck in such disasters, we planned for a project which is consist of a Machine which can easily travel through the air that is a "**Quadcopter**" and which can work on searching people on its own, which we can call it as "**Artificial Intelligence**". From here we came up with the title "**Intelligent Quadcopter**". To make a simple quadcopter intelligent, we use the concept of 'Image Processing'. Using this, we can make the camera connected on Quadcopter to scan the photograph of the hostage. Once the scan is complete, the image will be stored in the memory of the processor of copter. Now the copter will start roaming in the building or apartment searching (comparing) for the hostage which will have that image which is stored in it. Once the match is found, the copter will ring the alarm such that Rescue Force can easily find the hostages or the location of Copter.

Index Terms— artificial intelligence, quadcopters, Bluetooth module,

———————————— ◆ ————————————

INTRODUCTION

Drones are very popular toys and tools these days. You can find professional and even beginner drones and flying gadgets in the market. We are using the MultiWii flight controller that is based on the ATMega328 chip that is also used in the Arduino UNO, so programming was pretty simple. 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 you move on the street the drone follows me. Of course, has many failings yet, because I wasn't able to make a proffesional filming drone, but follows the phone, makes a video and also has a ultrasonic distance sensor to avoid the obstacles in the air.

PROCEDURES

Step 1: Main Properties

The drone is almost fully automatically, you don't have to control it, because follows your phone that is usually in you bike, 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:

- **1000mAh battery, enough for 16-18 minutes of continous flying**
- **ultrasonic sensor to avoid obstacles in the air**
- **Bluetooth module to recieve data from the phone**
- **Arduino based microcontroller**
- **build-in gyroscope**
- **regulated maximum height (5 meters)**
- **when battery is low automatically lands on the phone (hopefully in your hands)**

- **can be programmed to anything**
- **with the help of the GPS you can send the drone to any coordinates**
- **quadcopter desing**
- **equipped with a 2MP 720p HQ videocamera**
- **weighs 109 grams**

Step 2: Gathering parts and tools

Tools:

- Soldering Iron
- Glue Gun
- Cutter
- Wire Cutter
- Rotary Tool
- Super Glue
- Ductape
- Rubberband

Parts:

- MultiWii 32kB Flight Conroller
- Serial GPS Module
- Serial to I2C Converter
- Bluetooth Module
- Ultrasonic Sensor
- Straws
- Plastic Piece
- Gearing

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

Step 3: Assemble the Propellers

You just have to put the motor in its hole, and attach the props to the gearing.

Step 4: Assemble the frame

Step 5: Add wires to L293D

Step 6: Design the circuit and connect them together

Step 7: Connect the battery

Step 8: The ultrasonic sensor

The sonar sensor is fixed on the drone with a rubberband, and connected to the D7 and D6 pins of the MultiWii controller.

Step 9: Programming

You have to use a Serial FTDI module to program the chip. The kit also includes the programmer module.

Step 10: GPS

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 critical capabilities 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. GPS modules typically put out a series of standard strings of information, under something called the National Marine Electronics Association (NMEA) protocol.

Step 11: Software

First download the official MultiWii library to your computer. Extraxt the .zip file then open it the MultiWii.ino file. Choose "Arduino/Genuino UNO" and upload it on your board. Now your microcontroller has every function preinstalled. The gyroscope, the lights, the Bluetooth and even the small LCD (that is not used in this project) is working with the uploaded code. But this code only can be used to test if the modules work perfectly or not. Try to tilt the drone, and you'll see the motors will spin because of the gyrosensor. We have to modifiy the controller's code to follow the phone.

Step 12: Future plans

We also have a bigger drone and if we can correct the errors in the code I want to use it with that one through WiFi connection with an ESP8266 module. That has bigger rotors and can lift even a GoPro, not like the first version. This drone could be a useful tool while cycling, driving, skiing, swimming or sporting, he always follows you.

CONCLUSION

We have successfully tried to design a paper for making an intelligent quadcopter by using some artificial intelligence.

In the future we are looking forward to make our Quad copter fully autonomous without using any other sensor. Also, we are thinking of using GPS for long range autonomous flight or ultrasonic sensors for object avoidance. By using these techniques, we can reach to the level of autonomous Quad copter.

REFERENCES

[1] R. Lienhart and J. Maydt, "An extended set of Haar-like features for rapid object detection," in Proc. IEEE Int. Conf. Image Process., 2002, vol. 1, pp. 900–903.

[2] H. Huang, G. M. Hoffmann, S. L. Waslander, and C. J. Tomlin, "Aerodynamics and control of autonomous quadrotor helicopters in aggressive maneuvering," IEEE International Conference on Robotics and Automation, pp. 3277–3282, May 2009.

[3] http://astro.hr/library/Magnetometer.pdf

[4] http://blog.mobileapes.com/2010/04/control-all-four-motors-from-arduino.html

[5] Teppo Luukkonen, "Modelling and control of quadcopter," Independent research project in applied mathematics, Espoo, August 22, 2011.