

## Quad Copter with Wireless Camera

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*Abstract*--The military use of unmanned aerial vehicles (UAVs) has grown because of their ability to operate in dangerous locations while keeping their human operators at a safe distance. The larger UAVs also provide a reliable long duration, cost effective, platform for reconnaissance as well as weapons. They have grown to become an indispensable tool for the military. The question we posed for our project was whether small UAVs also had utility in military and commercial/industrial applications. We postulated that smaller UAVs can serve more tactical operations such as searching a village or a building for enemy positions. Smaller UAVs, on the order of a couple feet to a meter in size, should be able to handle military tactical operations as well as the emerging commercial and industrial applications and our project is attempting to validate this assumption. To validate this assumption, my team considered many different UAV designs before we settled on creating a Quad copter. The payload of our Quad copter design includes a camera and telemetry that will allow us to watch live video from the Quad copter on a laptop that is located up to 2 miles away. We are presently in the final stages of building the Quad copter but we still improving our design to allow us to have longer flight times and better maneuverability. We are currently experimenting with new software so that we will not have to control the Quad copter with an RC controller but will instead operate by sending commands from a remote laptop. Our project has verified that it is possible to build a small-scale Quad copter that could be used for both military and commercial use. Our most significant problems to date have been an ambitious development schedule coupled with very limited funds. These constraints have forced compromise in components selected and methods used for prototype development.

### I. INTRODUCTION

Quadcopter is one type of helicopter which will fly, we have connected one wireless camera on it. It will take live photograph & video. It will be controlled through remote.

#### A. Part List

##### 1) Frame

- Light Aluminum weight
- able to handle load at center of gravity of frame

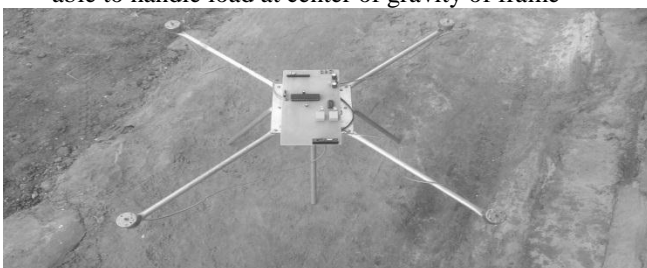


Fig. 1: Frame

##### 2) Motor

- To use lightweight motors for flight
- The motors must be cost effective
- Use motors with a total mass of 300g
- 11000 rpm
- Each motor is to be controlled via PWM signal from the processor



Fig. 2: Motor

##### 3) Relay

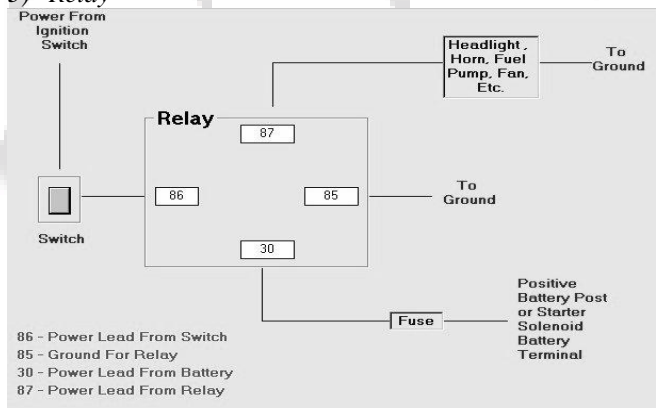


Fig. 3: Relay

Relay is simple switch, use for motor control

##### 4) PIC 16F877A Microcontroller

###### a) Features

- Flash memory technology
- 40 PIN programable chip
- Pwer supply : 2 to 5 volt
- Frequency : upto 20 MHz
- EEPROM

###### b) Pin function

- PIN 1: RESET
- PIN 2 TO 10 : general in/out
- PIN 11 : Vss
- PIN12 : ground
- PIN 13 to 29: general in/out
- PIN 30 : input from decoder
- PIN 31 TO 40 : general in/out



Fig. 4: PIC 16F877A Microcontroller

5) Voltage regulator (7805)

- Input : 5 - 18 v
- Ground : 0 v
- Output : 4.8 - 5.2 v

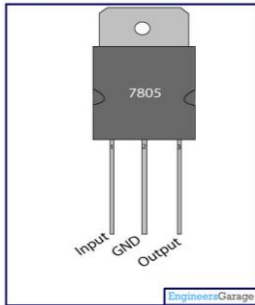


Fig. 5: Voltage regulator (7805)

6) Flight control

- Throttle
  - Controls Vertical Height
  - ↑: All faster
  - ↓: All slower
- Pitch
  - ↑: Front slower
  - ↓: Rear slower
- Roll
  - ←: Left slower
  - →: Right slower

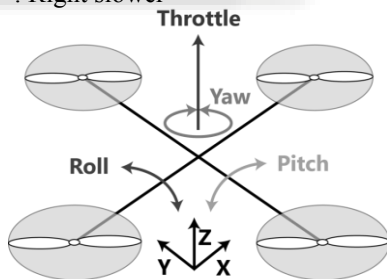


Fig. 6: Flight Control

7) ULN

It convert 5 volt to 12 volt for relay

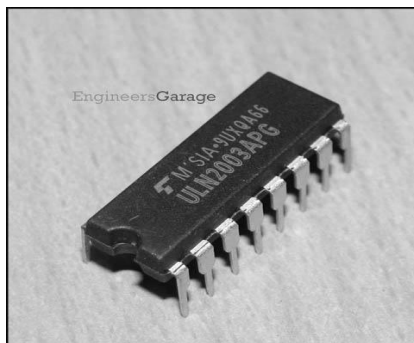


Fig. 7: ULN

8) Transmitter & Receiver

Working on 2.4 GHz full duplex

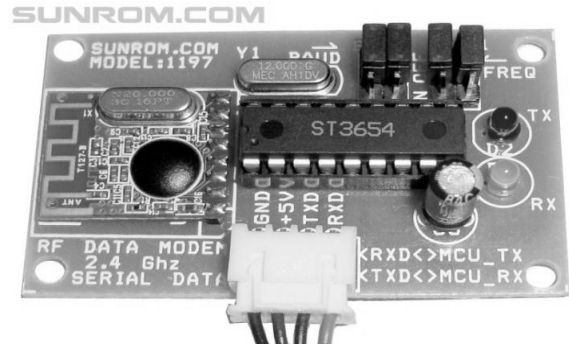


Fig. 8:

9) Camera

- The camera is Plug and Play and will work on most computer systems. There is No need to install any drivers.
- Remove the memory card from the camera.
- Turn the camera on before or after connecting it to the computer. Wait a few seconds, the computer system will recognize the camera as a USB PC Camera.
- You will need a web cam program, such as AMCAP, or another program that can stream video from an external device. Many video editing programs and online “messaging“ utilities also have this capability. If you see no video from the camera in your program, check the program's list of “devices” and confirm the “USBPC Camera” device is selected. If the “USB PC Camera” device does not appear in the list of devices, leave the camera in web cam mode and restart the program. The “USB PC Camera” device should now show up as a device, and you can select it to enable the video stream.

Note: there is no audio when this camera using as a webcam.

II. DIAGRAM

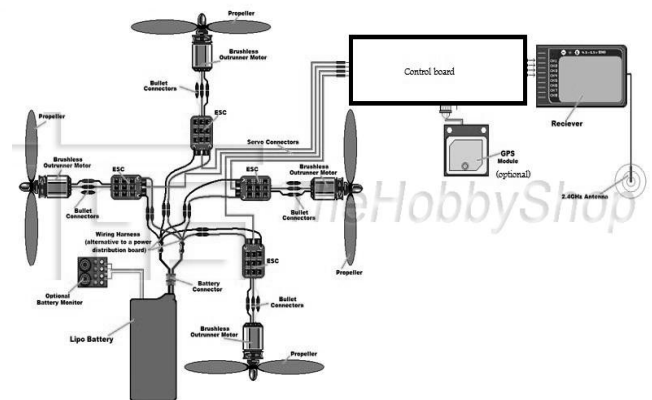


Fig. 9: Diagram

III. DESCRIPTION

The whole circuit board is mounted on light weighted aluminum frame. One camera is mounted below which will take live photos & video.

Four motor is connected through main circuit board i.e. receiver. Relay is connected on it, which is used as

switch for motor and propeller are connected on it. Main circuit board contain relay, microcontroller, ULN 2003, voltage regulator 7805, and also battery 12 V.

Microcontroller works on 5v but battery supply provides 12 V so avoiding damage of microcontroller we use voltage regulator. But to control relay we want 12 volt, so to convert 5 V to 12 V we connect ULN 2003.

Transmitter control the whole quadcopter i.e control by user. Radio communication is done by tx/rx.

#### IV. APPLICATION

- Military and commercial use
- aerial photography
- Survey that area where men can't reach

#### V. CONCLUSION

As per the design specifications, the quad-copter self stabilizes using the array of sensors integrated on it. It attains an appropriate lift and provides surveillance of the terrain through the camera mounted on it. It acts appropriately to the user specified commands given via a remote controller.

It's purpose is to provide real time audio/video transmission from areas which are physically inaccessible by humans. Thus, it's functionality is monitored under human supervision, hence forth being beneficial towards military applications. It is easy to maneuver, there by providing flexibility in its movement. It can be used to provide surveillance at night through the usage of infrared cameras. The system can further be enhanced for future prospects.

#### VI. SCOPE FOR FUTURE ENHANCEMENTS

Future of a quad-copter is quite vast based on various application fields it can be applied to Quad-copter can be used for conducting rescue operations where it's humanly impossible to reach. In term so fits military applications it can be more widely used for surveillance purposes, with out risking a human life. As more automated quad-copters are being developed, there range of applications increases and hence we can ensure there commercialization. Thus quad-copter can be used in day to day working of a human life, ensuring their well-being.

With further study and advancement in technology, designers are quite sure that a quad-copter can be used for construction of huge towers and buildings. The main advantage in the future use of a quad-copter for various purposes is that risk to human life, may it be because of war or due to commercial accidents can be greatly avoided. The future of quad-copter sure is bright and not far ahead.

#### REFERENCES

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