International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-8 Issue-3, September 2019

A Weather Monitoring Unmanned Aerial Vehicle

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Abstract- The mankind has boomed in the 20th century, and this results the huge level of damage to the ecosystem. The technology which was developed for the convenience of the mankind has indirectly stressed in the environment and thus contributed knowingly to global warming. Therefore, it is required to monitor the environment so as to maintain the damage to it, and also to deal with the upcoming disasters by the means or proper supervision, one way of performing these activities is preferred by Unmanned Aerial Vehicles (UAVs). The UAVs can perform multiple of tasks at once, and it can be used for supervision in multiple fields such as military bases, house, colleges and other restricted, personal or public areas.

Keywords- UAV, military, global warming, camera, RC plane, temperature sensor, gas sensor, humidity sensor, Bluetooth, light sensor and BlueTerm.

I. INTRODUCTION

Unmanned Aerial Vehicles are extremely appreciated now a days, the UAVs are suitable for surveillance as it has many profitable features. UAVs have ability to perform multiple functions with or without controlling of human. It has high potential to be used in remote sensing applications, surveillance and scientific research. The project is focused on investigating the capacity of an economical UAV in monitoring a broad area and sending back the information back to the user at the ground. The multiple sensors are installed in the aircraft that takes readings of humidity, temperature, gas (CO) levels. The wireless camera is mounted in the aircraft for providing visual inputs to the user, providing ease to user to be protected and safe. Such frameworks can be valuable for investigating a zone that might be unavailable to people, for instance in case of an atomic fiasco, it is appropriate to send such kind of a UAV to quantify the radiation levels noticeable all around than sending a group of individuals into the influenced area[1].
Various pollutants can be recognized and identified from an airborne stage by their appearance in unmistakable shading or in the infrared range. One application would include utilizing a comparative UAV outfitted with a variety of explicit substance 'sniffers'.

Manuscript published on 30 September 2019
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Truth be told, the sort of Unmanned Aerial Vehicle made here can be useful if there should be an occurrence of a backwoods fire also, with a couple of more sensors (for wind speed and course) it can successfully help putting out fires authorities screen and handle the spread of the flame through the wilderness[2].

II. MOTIVATION

Around mid-September 2006, only weeks following the tropical storm Katrina, another typhoon named Ophelia was followed off the Atlantic seaboard of the United States. Despite the fact that it was littler than the Katrina, in a way it was very critical. It was during this time when an organization named AAI (situated in the United States of America) propelled the Aerosonde, a UAV. It was the first run through when an unmanned flying machine entered a cyclonic tempest. A UAV like the Aerosonde, which during the tempest sent back estimations rapidly to researchers and administrators securely on firm ground many miles away, reduces any opportunity of threat to individuals engaged with tempest look into[3]. What's more, with ongoing transmission of information, regardless of whether the plane goes down, analysts at any rate have all estimations up to the minute the information transmitter in the flying machine fizzles. Albeit climate satellites would already be able to take pictures of tempest frameworks from above, scientists can position a UAV straightforwardly over the eye of the tempest freely (just as off to the side, for diagonal pictures), and the UAV can quantify environmental conditions close to the tempest notwithstanding gathering symbolism, something that is unthinkable for a satellite in circle over the world's atmosphere[4].

III. HARDWARE DESCRIPTION

RC Plane

The project is prepared by deploying a Hobbyking Bixler 2.0 plane (as shown in Fig.1) which works on mode 2 controls. The plane used in this project is preferred for the beginners as it is prepared by the hard material so it is durable and tough at work. The material used for the manufacturing of the plane is Expanded Poly Olefin (EPO). The plane consist of 4 servo motors, 2 attached to its wings for its flaps, 2 attached at the back side (one for the elevator flaps and another one for the rudder)[5]. To control the speed of the RC plane a 20A Electronic Speed Control (ESC) is used to control the motor we employed in the project[6]. We used a Brushless Out runner Motor, as they provides a lower rpm, but provides high torque and drive their propellers correctly.

The weight and complexity is eliminated by the used motor. The motor size is determined by the weight of the model airplane, which determines the propellers size. For providing the capability of RC a transmitter-receiver of 5 channel, 2.4 GHz is established. The three 3.7V Lithium polymer battery is used herein to provide a 12 power supply.

Figure 1

1.1. Chipset

The chipset basically circuitry installed in the airplane for supervising the weather parameters contain of a wireless camera (for visual input) and a Bluetooth module (BC417) to access the sensor reading on the user cell-phone by means of BlueTerm (app of android). The sensors used in this project are mentioned below:

1.1.1. Temperature sensor (LM35)

The LM35 series are exactitude integrated –circuit temperature sensors. The LM35 does not require any outside alignment or cutting to give normal correctness's of ±¼°C at room temperature and ±¾°C over a full −55°C to +150°C temperature go. Minimal effort is guaranteed by cutting and adjustment at the wafer level. The low yield impedance, direct yield, and exact innate alignment of the LM35 make interfacing to readout or control hardware particularly simple. The gadget is utilized with single power supplies, or with in addition to and short supplies[7].

1.1.2. Gas Sensor (MQ-7)

They are utilized in gas recognizing gear for carbon monoxide (CO) in family and industry or vehicle. The MQ-7 can recognize CO-gas fixations somewhere in the range of 20 to 2000ppm. This sensor has a high affectability and quick reaction time and the sensor's yield is a simple opposition. The drive circuit is basic; you should simply control the warmer curl with 5V, include a heap opposition, and associate the yield to an ADC[8].

1.1.3. Humidity Sensor (HS220)

This sensor module changes over relative humidity (30-90%RH) to voltage and is valuable for climate checking applications. This sensor has a working scope of 0-60°C and gives an exactness of ± 5% RH (at 25°C, 60%RH) where RH is the relative dampness[9].

1.1.4. Light Sensor (LDR)

LDRs or Light Dependent Resistors are extremely helpful particularly in light/dim sensor circuits. Regularly the obstruction of a LDR is exceptionally high, in some cases as high as 1000 000 ohms, yet when they are lit up with light opposition drops drastically.

IV. SOFTWARE DETAILED DESCRIPTION

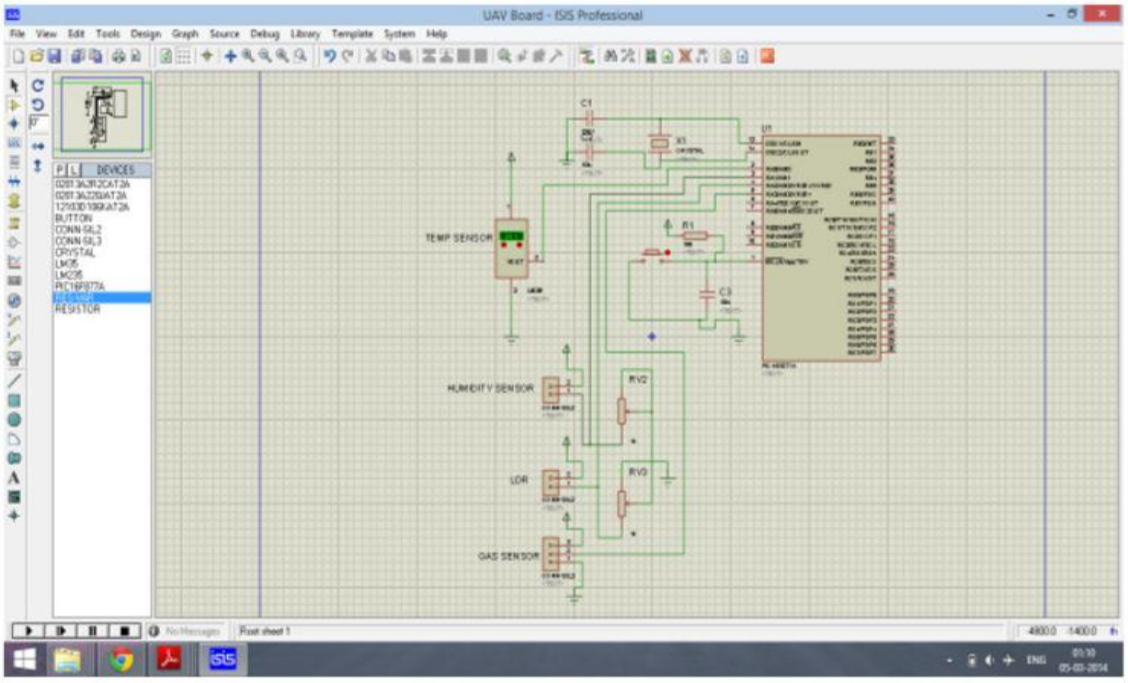

Figure 2

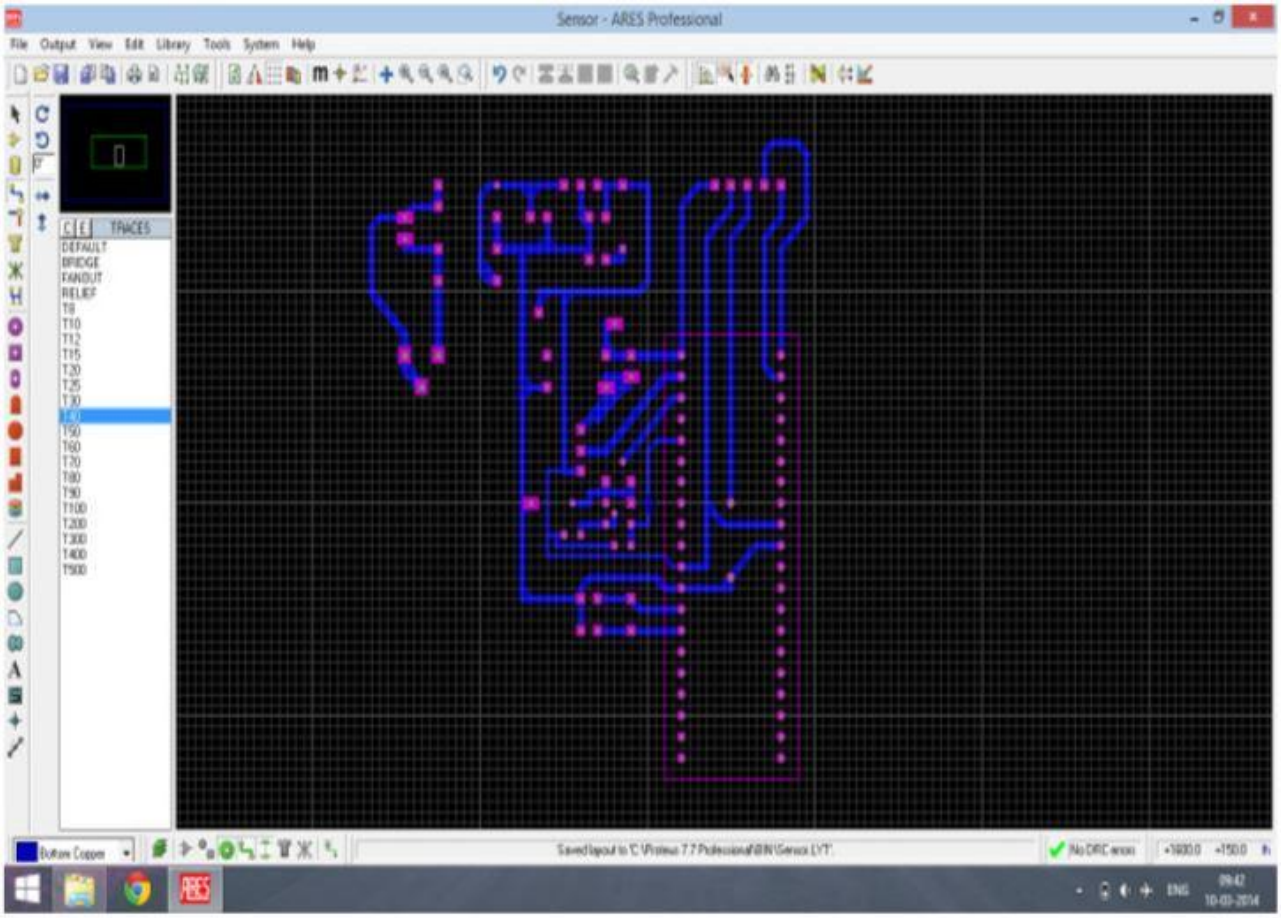

Figure 3

The PCB was made with the assistance of Proteus 7.7 Professional programming. Here we utilized ISIS for making the schematic chart as appeared in Fig. 2 and for making the PCB we utilized ARES programming as appeared in Fig 3. So as to see our yield on a telephone we utilized the BlueTerm application accessible in android.

V. FIELD TEST

The plane testing is performed on the open area. As the Bluetooth module range is not too much, we must operate the plane on the range of the module or the circular range of the module. The reading received by the cell-phone is shown in the figure 4. And figure 5. And the weather was clear and sunny. Some can predict that the gas sensor isn't working but the unavailability of the gas is the reason behind the no reading of the gas sensor. For the shake of testing the gas sensor we lit an incense stick near to the gas sensor and the detection reading is shown in the figure 6. Note: The gas sensor provides reading in the BlueTerm only when it detects the smoke and the gas is unavailable it simply does not visualize it at all, as we can observe in the screenshots.

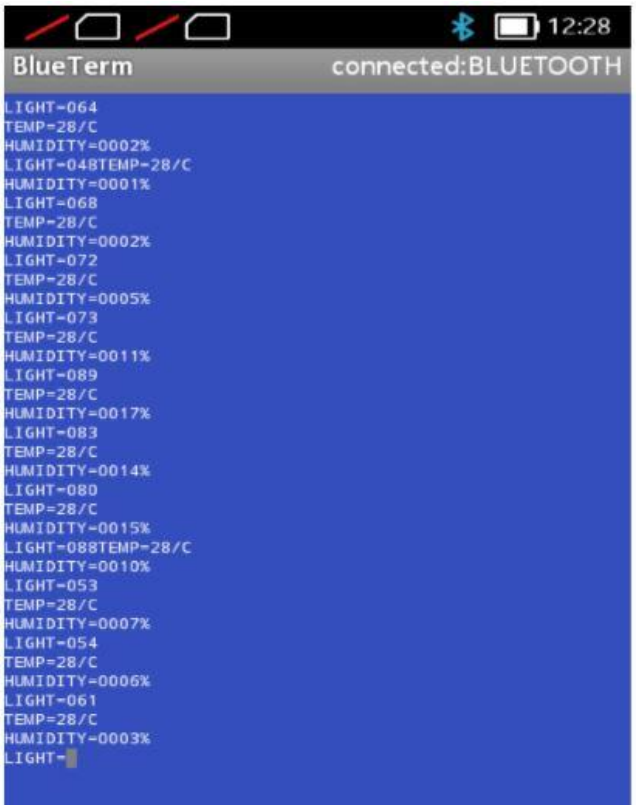

Figure 4

Figure 5

Figure 6

VI. CONCLUSION

In this project a detailed description of the hardware and software of economical weather supervising UAV is provided, along the tested results. The aim of the project was to fulfil the surveillance demand and other demands in low budget. However, to achieve the true potential the high definition camera and long range transmitter receiver can be used to increase its performance.

A foremost advantage of the project is to be used by pollution control departments of developing countries, as they will monitor the pollutions emitted by the industries into the atmosphere. This would help the environment of the country to maintain the ecosystem and reduction in carbon footprint of their country as well. The UAVs are the next generation invention as it is improving day by day by its features as per its use, its use is not restricted by the military or surveillance purpose but it can do other things as well. The user of the UAVs are safe while controlling also as it can be controlled from anywhere. It can be used for ocean calamities study.

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