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RF ID Based Unmanned Aerial Robot

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Abstract - An aerial robot is a system capable of sustained flight with no direct human control and able to perform a specific task. Unmanned aerial robot has wide range of applications that includes: Remotesensing, Surveillance, search and rescue. In this paper an aerial robot flies using RF technology, interfaced by PIC microcontroller. This aerial robotics having three parameters i.e. camera, temperature sensor and gas sensor. The code has written in 'C' language and verified using Kiel software.

Keywords- Low-cost sensors, unmanned vehicle, RF ID, Microcontroller 16F877, PPM.

I. Introduction

The significance of unmanned aerial robot comes from its ability to provide services like military and civilian applications. Prime examples are Unmanned Air Vehicles (UAV) for borders patrol, ground attacks, forest fires monitoring. Unmanned aerial vehicles (UAVs) commonly referred to as drones that are remotely piloted aircraft or systems [1]. They range from simple hand-operated short-range system. They can also be referred as Unmanned Aerial Systems (UAS) and Remotely Piloted Aircraft (RPA) [2]. Unmanned aerial vehicles or systems have a number of strength compared to manned aircraft. UAVs help minimize the risk to aircrew operating in hostile territory and can be used for 'dull, dirty and dangerous' tasks. They can be more cost effective and provide a significant intelligence, surveillance, whether that is 'over the hill' sight for soldiers on the ground or a persistent presence in the air which can help provide a more complex intelligence picture for commanders. They are more expendable than manned craft, at least in terms of human life [5]. With the implementations of Micro Electro- Mechanical Systems (MEMS) and GPS has increase the role of aerial robot in many applications. Inspite of this, there are many challenges like cost and down scaling of aerial robot appears very difficult [12]. In this we mainly focus on aerial robot using low cost sensors based on RF ID.This paper is organized as follows.

II. Approach

The design concept involves designing of a model of Unmanned Aerial robot using Radio frequency based on Microcontroller. The sensors LM35 and MQ6 implemented in Robot to read values and transmit those values using Radio frequency. The microcontroller 16F877 calibrates that ADC values and give command to LCD (Liquid Crystal Display) to display the temperature reading in ^{0}Kelvin and gas reading in PPM. The flow chart of aerial robot is shown in figure 1.

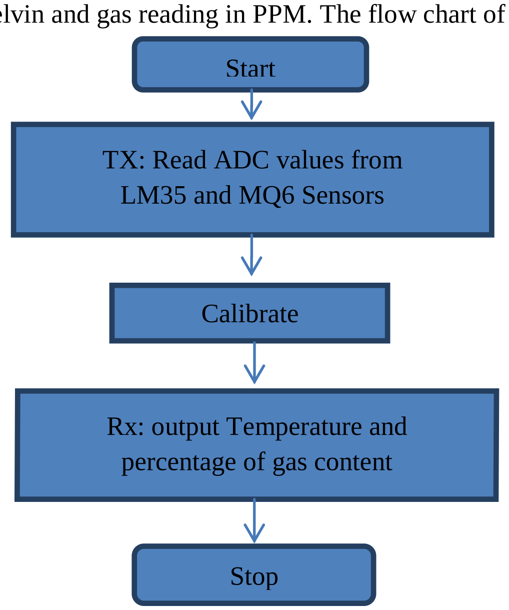

Figure 1: Flow chart of Aerial Robot.

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A. Features of aerial robot

a. Based on Radio Frequency (2 to 22 MHz).
b. Deliver small physical objects.
c. A flying robot can visit places, or follow objects, and record and/or transmit everything it can observe.
d. Being airborne, cheap and anonymous - allow to do lots of things from which the society doesn't have much protection.

B. Implementation of hardware

The electronic part of aerial robot is designed using PIC (16F877) microcontroller, camera, gas and temperature sensors. Block diagram of the Aerial Robot is shown in figure 2.

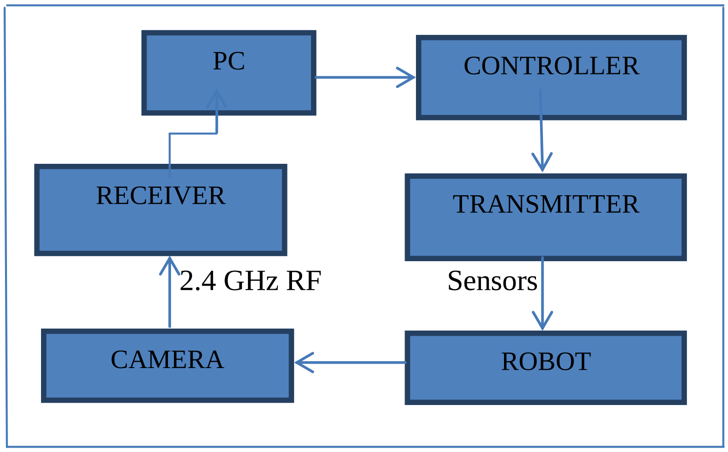

Figure 2: Block diagram of aerial robot

1) *Overview of various sections interfaced*:

a. Microcontroller Section:
PIC 16F877 is used in this model to interface two sensors i.e. LM35 and MQ6. It is an 8 bit high performance microcontroller and uses low power. It act as an intermediate between input and output.

b. Power supply section:
This section provides the necessary +5v to the microcontroller and for the aerial robot 12v DC battery has been used, that provide power to the servo motors and also to various sensors applicable to the aerial robot.

c. LCD section:
LCD is a Liquid Crystal Display. The HD44780U LCD is used for displaying the readings received by temperature and gas sensors. It is a dot-matrix liquid crystal display controller and driver LSI displays alphanumeric and symbols.

d. Sensors:
Temperature sensor (LM35) and Gas sensor (MQ 5) are the two sensors implemented in aerial robot. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the kelvin temperature. The LM35 thus has an advantage over linear temperature sensor calibrated in ^{0}Kelvin.
The MQ5 is used to detect the presence of gas in that area.

e. Camera:
The C328-7640 VGA camera is used in this model. This VGA camera module performs as a JPEG compressed still camera and can be attached to a wireless or PDA host.

III. **RESULT**

The result can be described in three different sections:
The first section is sensors section. When the aerial robot flies to some other place the temperature and gas sensor sense the temperature and the presence of any gas. The second section is output section where LCD displays the readings received from the two sensors in ◦Kelvin and PPM. The last section is the camera section which shows what is happening in that particular area. The complete design of aerial robot is shown in figure 3.

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Figure 3: Design of aerial robot.

IV. CONCLUSION

In this paper, an aerial robot is designed which successfully overcome the various challenges faced in distinct fields, including state regulations, man-machine interface design issues, navigation, reliability, collision prevention and take-off/landing technique.

REFREENCES

[1] Bhagwat, Mahendra J., et al. Flow Visualization and Measurements in the Wake of a Rotor with Subwing Tip, Annual Forum Proceedings-American Helicopter Society,vol. 1,1999,pp.951-962.
[2] Bramwell, A.R.S. Helicopter Dynamics. New York: Halsted Press, 1976.
[3] Gessow, Alfred and Myers, Garry C., Jr. Aerodynamics of the Helicopter. New York: MacmillanCompany, 1952.
[4] Ghee, Terence A. and Elliot, Joe W. The Wake of a Small-Scale Rotor in Forward Flight Using FlowVisualization, Journal of the American Helicopter Society, vol. 40, no. 3, July 1995, pp. 52-65.
[5] Gunston, Bill and Spick, Mike Modern Fighting Helicopters. New York: Crescent Books, 1986.
[6] Johnson, Wayne. Helicopter Theory. Mineola, NY: Dover Publications, 1980.
[7] McCormick, Barnes W. Aerodynamics, Aeronautics and Fight Mechanics. New York: John Wiley & Sons, 1995.
[8] Newman, Simon. The Foundations of Helicopter Fight. New York: Halsted Press, 1994.
[9] Seddon, J. Basic Helicopter Aerodynamics. Reston, VA: American.
[10] Institute of Aeronautics and Astronautics, 1990.
[11] Stepniewski, W.Z. and Keys, C.N Rotary-Wing Aerodynamics. Mineola, NY: Dover Publications, 1979.
[12] Computer Vision Group, Universidad Politécnica de Madrid, C. José Gutiérrez Abascal 2. 28006 Madrid, Spain. Omnidirectional vision applied to Unmanned Aerial Vehicles (UAVs) attitude and heading estimation.
[13] Young, Raymond A. Helicopter Engineering. New York: Ronald Press Company. 1949.

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