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Ultra Stable Flying Robo

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Abstract— Today we are running out of energy, out of resources, space, etc. high competition in the field for giving more service with lowest cost and maximizing the service. Innovations and inventions are taking place all over the world for delivering the service at lowest cost. The man mobility is decreasing and the work he can do from one place is increasing day by day. Here we are describing a flying object which can fly through the sky for multiple tasks with cheap maintaining costs. For example giving internet, television channels, parcel service, Traffic monitoring etc. are little while we consider the whole scenario. About the device, this device works with the solar energy incorporated with Lithium cells / NiCd Battery chemistries.. Idea by Bionic imitations. And this device has 8 legs which will be used for float movement. It also has gyroscope and accelerometer for steady movements. The attached GPS will enable the device positioning on to deferent geo locations. Communicating with the device is another crucial factor. So far we have two options for the movement. One is the pre allocated trip route set by GPS co-ordinates. Another one is that to establish a wireless RF connection with the device or using the available mobile networks.

Keywords— Flying object, Arduino, Xbee, GPS, Servo Motor, Communication, Shield

I.INTRODUCTION

The 'Ultra Stable Flying Robo' project is to create a small, cost effective and highly stable autonomous flying robot that can be used both indoors and outdoors under any weather conditions. Also it is easy to provide unidirectional communications like Television radio etc. As the range from receiver and transponder is less also better clarity and better reception can be achieved with least error rates in the communication Many of us think of the Internet as a global community. But two-thirds of the world's population does not yet have Internet access. Project Loon is a network of balloons traveling on the edge of space, designed to connect people in rural and remote areas, help fill coverage gaps, and bring people back online after disasters.

A. Components Required

Hardware Components: Hardware components comprises of the following:-

- Arduino ,Xbee Sheild ,Xbee ,GPS ,Motors ,Power supply ,LED ,Resistors ,Capacitors ,Diodes

Software Components: Software components comprises of the following:-

- Arduino programming software
- Assembly language

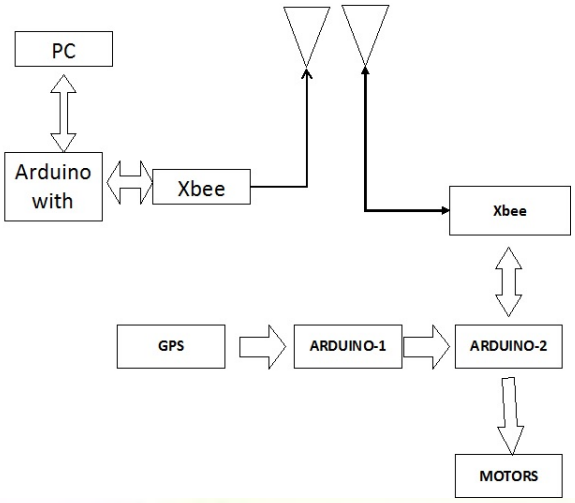
A. Introduction To Embedded Systems

1) Definition: Embedded System Any sort of device which includes a programmable computer, but itself is not intended to be a general-purpose computer.

2) What is an Embedded System An embedded system is a microcontroller / digital signal microprocessor based system that is designed to be flexible and built to control or monitor the functions of equipment, machinery, plant and many devices in common use today.

II. METHODOLOGY

A. Block Diagram



. In the ground section of our project we are using a Xbee module and a Arduino board. The commands from the PC are given to the arduino board through the USB port of the pc. The arduino board gets these commands through this USB connection. The arduino board are connected to Xbee module. The Tx and Rx pins of arduino are connected to the DIN and DOUT pins of Xbee module. Xbee module will send the data to the balloon system.The GPS co-ordinates from the balloon will reach the ground Xbee antenna. This data is given to PC.

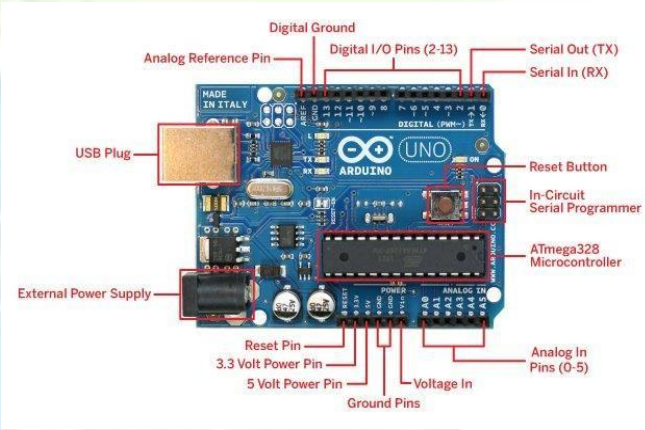
Circuit diagram consist of 2 arduino boards, Xbee module GPS module and motors. GPS module is connected to 1st Arduino board. The TXD and RXD pins of arduino connected to TX and RX pins of GPS module. Data from 1st arduino board connected serially with 2nd arduino board. ADC5 and ADC4 of 1st arduino is connected to same two pins 2nd arduino. Motors, Xbee modules are connected to 2nd arduino board. Motors are connected IO9.Txt and Rxr pins of GPS module are connected to pin 0 and 1 of 1st arduino board. This data is serially connected to 2nd arduino. Txt and Rxr pins of Xbee module are connected to 0 and 1 of 2nd arduino. Pulse signals for motors are taken from pin 9 (IO9) of 2nd arduino.

GPS co-ordinates from GPS module are send to 1st arduino. This data is taken serially by 2nd arduino and send through RF signal by Xbee module. This same Xbee module is used to receive commands from base station. Based on this command,2nd arduino board will run the motors attached to it. For servo motors, pulse signals are required to run it. This pulse signal are obtained from pin 9 (IO9) of 2nd arduino board.

B. Detailed Description

Arduino:

Arduino is an open-source prototyping platform based on easy-to-use hardware and software.It is flexible,offers variety of analog and digital inputs SPI an d seriel interface and digital and PWM outputs. In our project Arduino are used to control varies devices. There are 3 Aduino's are used in our project.In the base station one Arduino is used to connect to the Xbee module.On the other hand other two Arduino's are connected with Xbee and GPS respectively



Xbee sheild

Sheilds are boards that can be plugged on the top of the Aduino PCB extending it's capabilities. EveryArduino shield must have the same form-factor as the standard Arduino. Power and ground pins on one eight (previously six) pin header, and analog pins on a six-pin header next to that. Digital pins cover the other edge on the other side, an eight-pin header separated from a 10-pin by that weird 0.5" spacing. Some shields also require a connection to the Arduino's ICSP header (the 2x3 programming header on the end). The Xbee shield allows an

Arduino board to communicate wirelessly using Zigbee. It is based on the Xbee module from MaxStream. The module can communicate up to 100 feet indoors or 300 feet outdoors (with line-of-sight). It can be used as serial/usbreplacement or you can put it into a command mode and configure it for a variety of broadcast and mesh networking options.

XBee

XBee and XBee-PRO ZigBee RF modules provide cost-effective wireless connectivity to electronic devices. They are interoperable with other ZigBee PRO feature set devices, including devices from other vendors. XBee and XBee-PRO ZigBee modules are ideal for applications in the energy and controls markets where manufacturing efficiencies are critical. The Serial Peripheral Interface

(SPI) provides a high-speed interface and optimizes integration with embedded microcontrollers, lowering development costs and reducing time to market. Features like binding and multicasting also allow are features. XBee modules are used in the base station to communicate with flying system to give commands. Also balloon communicate with base station to give current GPS position

GPS

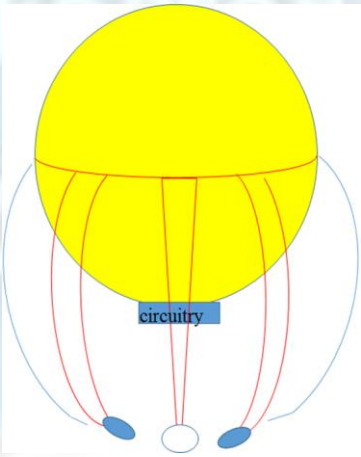
With this GPS Shield populated with GPS module from rhydoLABZ you can add GPS functionality to your Arduino or you can receive the NMEA data on your PC/Laptop with a easiness of sliding a switch. A footprints for popular EM-406 GPS receiver, EM-408,PA4 GPS and EB-85A connectors are also made available. This GPS shield is based on the latest Arduino R3 Layout with additional pins and is compatible to latest Arduino DUE which requires 3V as well as all other Arduinos and clones @ 5V. GPS module is fixed on the flying system to fix the flying system in a specific GPS co-ordinate. Base station could give new co-ordinates which causes the system to move to new coordinate. From base station, we could analyse the position of balloon using GPS

Servo motors

Servo motors (or servos) are self-contained electric devices that rotate or push parts of a machine with great precision. The simplicity of a servo is among the features that make them so reliable. The heart of a servo is a small direct current (DC) motor, similar to what you might find in an inexpensive toy. These motors run on electricity from a battery and spin at high RPM (rotations per minute) but put out very low torque (a twisting force used to do work— you apply torque when you open a jar). An arrangement of gears takes the high speed of the motor and slows it down while at the same time increasing the torque. A tiny electric motor does not have much torque, but it can spin really fast (small force, big distance). The gear design inside the servo case converts the output to a much slower rotation speed but with more torque (big force, little distance). The amount of actual work is the same, just more useful. Gears in an inexpensive servo motor are generally made of plastic to keep it lighter and less costly. On a servo designed to provide more torque for heavier work, the gears are made of metal

Servo Motor

System overview



Circuit explanation

The floating system of this project is a balloon having 8ft in diameter. This is a super pressure balloon filled with Helium (He). This balloon is in circular shape. The word super pressure means that volume of the balloon will not increase with height. Legs of the floating system are attached to the balloon. There will be eight legs of 2 meter

in length. These legs are equidistant from one another when attached to the balloon. Movement on this legs are made using servo motors. All the electronic components are attached at the bottom of the balloon.

Our floating system consists of 6 legs. Each leg is attached to each servo motor. When the motor rotates, wings will generate to and fro motion. This motion is used to keep the system stable at a particular GPS co-ordinate. Our system is designed in such a way that weight of the system will be zero at a particular height. In this project, we are designed such a way that weight of the system at 1000 feet will be zero. There will be a shift in position of the balloon due to wind, gravitational force etc. This movement is compensated by the motion of legs. Initially the system will be in rest at a particular height. At this stage intermittent flaps are necessary to maintain the system stable. There will be a shift in position mainly due to the effect of wind and gravity. This shift in position is compensated by the movement of legs. The legs can be operated individually so that movement of system in any direction can be achieved.

III.FUTURE SCOPE

As a future scope this device can act as a distant wireless internet router. Solar with laser technology, we can avail high speed internet routing through rural areas, where the high speed networks are not available. So far the development focusing on the placement of the device at desired place with extra stability and then we will move on to future development and extra features attachment.

IV.CONCLUSION

So by doing the project 'ULTRA STABLE FLYING ROBO' which can be used as internet hub at rural areas for free internet points. Also it is easy to provide unidirectional communications like Television, radio etc. As the range from receiver and transponder is less also better clarity and better reception can be achieved with least error rates in the communication. Incorporating of laser and RF communication will be a great achievement today. Thus the device can be implemented like lowest distant earth wireless points at desired orbits.

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