

Unmanned Ground Vehicle

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Abstract—This paper presents an idea to do surveillance of specified area with four wheeled Unmanned Ground Vehicle (UGV) which is controlled remotely using Android app. The main purpose of the project present in this paper is to reduce the effort made by human in surveillance of high risk places (terrorist, seismic zone etc)In this paper we have suggested a surveillance system which is best in terms of range, flexibility, control, cost etc. It has a great range as it work with concept of IOT. This paper also presents the idea of overcoming the problem of flipping of the robot. The live video feedback from the UGV can be used by the controller to change the direction of UGV according to the requirements. The proposed system (UGV) is self compact and self contained with wireless transmission of data. The location of UGV can be traced with the help of inbuilt GPS module. The location of the UGV gets displayed in the android app when the user request for it.

Keywords-UGV (Unmanned ground vehicle),GPS (Global Positioning system),MCU (Microprocessor control unit), USM(Ultrasonic sensor module), OS(Operating System)

I. INTRODUCTION

Now-a-days technologies play an important role in our life. Since few decades robotics has developed drastically solution for various controlling purpose.

The current surveillance systems present it the market our very expensive and have limited capabilities. A large base station is required in order to communicate with the robot and have unnecessary features. In this paper we have proposed a surveillance system and an application for mobile device which run over android OS. We have used the concept of IOT for controlling the UGV for surveillance. This system provides the live video obtaining from the robot and user can get the location of the robot from the inbuilt GPS module [1]. The suggested system has big advantage of flipping. As the robot will be able to work even after if it gets flipped by 180°. User can still get the control over it. UGV is designed in such a way with IR sensor that will inform the used about the sides facing downward or upward and robot direction.[2][3].

II. METHODOLOGY

The robot is placed on ground and power supply is given, the robot is ready to receive command. The user now has to open the app in the Smartphone and the commands will be received on phone.The atmega 328 receives the command with the help of Wi-Fi module connected to it [4] Now command is processed and the input to the motor driver is given. The motor driver give power to move the vehicle around.The MCU keeps on checking for any obstacle in the path with the help of ultra sonic sensor module placed at the front of the robot. The USM keeps on checking for obstacle and calculating the

distance of obstacle.The robot stops if it gets too close to any object.(Range approx. 10mtr)[5].

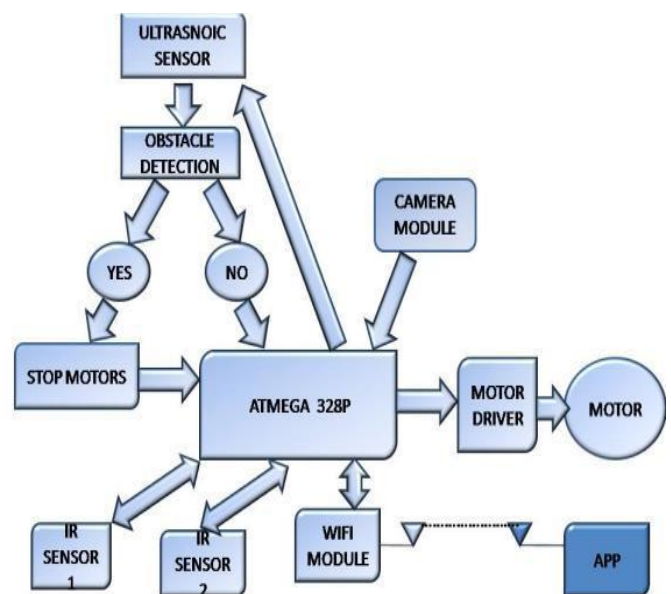


FIGURE 1:FLOWCHART OF WORKING

The controller can see the live video feedback from the camera of the robot and can decide on the further step to take.

GPS Module is used to keep the track of the robot and locate the place in case of any accident or mishap. The location update of robot is done By using Android App. When the robot flips this orientation information updates in the android app. As the robot has two IR sensors and the whole programming anf working changed accordingly. This helps in proper handling of the robot and direction otherwise there will

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be issue in controlling the robot as it will go in opposite direction for the given command .

III. SOFTWARE

Arduino 1.8.2 is a open source software makes it easy to write and upload it to the board. It runs on Windows, Mac OS and Linux. This software can be used with any board. Arduino was born at the interaction design institute Ivrea Idll from the sampling wiring project as an easy tool for fast prototyping. Software is inexpensive and flexible hardware, simple programming environment and works on multiple platforms. [6]

IV. HARDWARE

Atmega 328p is a high performance microchip 8-bit AVR RISC based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counter with compare modes. Serial programmable USART, SPI serial port. [7]

Ultrasonic sensor HC-SR04 is an ranging module providing 2cm to 400cm non-contact measurement function, the accuracy of this module is up to 3mm. The module consists of ultrasonic receiver, transmitter and control circuit. The distance is measured using test distance formula (high level time X velocity of sound (340M/S)/2). It first needs to provide a short 10us pulse to the trigger input to start the ranging and then module sends out an 8 cycle burst of ultrasonic at 40 KHz and raise its echo. [8]

L298n Motor Driver- is a dual bidirectional motor driver using H-Bridge. This module allows user to control 2 Dc motor in two directions or control one bipolar stepper motor with ease. The L298N H-Bridge module can be used with motors that have voltage requirement of 5V to 35V DC.

ESP8266 Wi-Fi module- this is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your network. Each ESP8266 module comes pre-programmed with an AT command set firmware, so that user can simply hook this up to atmega 328p chip and get about as much Wi-Fi ability as a Wi-Fi Shield. It contains a self-calibrated RF allowing it to work under all operation conditions and requires no external RF parts. [9]

Skytraq S1216F8-BD(GPS MODULE)- It contains skytraq Venus 8 positioning engine inside, featuring high sensitivity for indoor operation, low power consumption, and fast TTFF. The superior148Dbm start allows it to acquire track and get position fix autonomously in difficult weak signal environment. The receivers 165Dbm tracking sensitivity allows continues coverage in nearly all kind of environment.

The S1216F8-BD has LNA for easy integration and passive antenna and SAW filter for increased jamming immunity. It can work with both active and passive antenna. [10]

IR sensor module- This is made using LM358 IC is used as comparator when ir receiver sense IR radiation . then the Output of lm358 goes high and led connected to is set high and the output pin of lm358 is set high which is connected to the microcontroller.

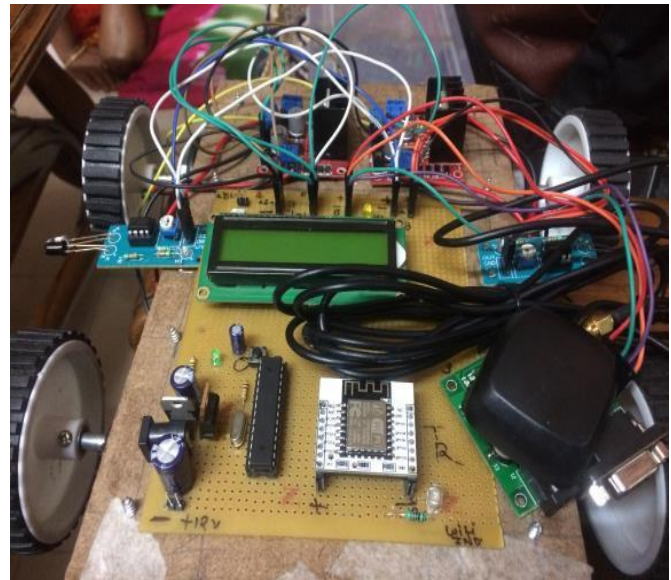


FIGURE 2: HARDWARE

V. CONCLUSION

The Proposed system can be used for surveillance in any area where network is there. This system can be controlled from Smartphone and can monitor through live feeds from the camera integrated with it. It can work even after the UGV is flipped (180 degree) in case of steep slope and operated normally.This system cuts down the limitation of requirement of base station to monitor it. This system has lots of future possibility as it will modernize the way of surveillance. [11]

VI. FUTURE SCOPE

This proposed system can greatly help in surveillance area where it is dangerous for human to operate.

Using APM 2.8 for autonomous operation of the UGV with the help of onboard sensor.

Charging of battery of UGV with the help of solar panel on it to extend the time of operation of UGV. [12]

Can avoid causality of soldier in surveillance near military base station.

Can be used in detection of any leakage of hazardous chemical gas in chemical industries with the help of gas sensor and chemical sensors. [13]

In mining industry where the human reach is difficult because of the low space.

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