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Video Surveillance Robot

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Abstract: Robotics and automation is the field which has made lot of impacts on industrial as well as household applications from last few decades.The reason behind the wide use of robotics is it's ability to make changes in previously made systems and also it is time consuming.The project is designed to develop a robotic vehicle using android application for remote operation and it is attached with camera for monitoring purpose. The robot along with camera can wirelessly transmit real time video using wifi.These robots can be useful for spying purpose in wars.The android application is developed on mobile devices, can connect with security system . The security system then acts on these command and responds to the user. The camera and the ultrasonic sensors are attached with security system for remote surveilliace. A robot is a machine capable of carrying out sequence of activities which are programmed already. A robot can be controlled by a human operator.In such type of applications wireless communication is more important. This paper shows general idea of the Design of robotic vehicle using Arduino board.This robot can move in remote area and capture the images by using camera.

Keywords : Arduino board, Camera, Servo motor Ultrasonic sesnsor,wifi module.

INTRODUCTION:

Surveillance is the process of monitoring a region or person.Survellience usually requires in a military border surveillance and enemy territory is essential to the security of a country. Human Monitoring is achieved by deploying close to sensitive areas of staff to constantly monitor the changes. But humans have limitations and deployment in places that are not always possible. There are also additional risks losing the staff in case of being caught by the enemy.By providing the high resolution cameras and various sensors, it is possible to obtain distance information of specific area. Nowadays most of the system uses robots which can be from one place to another .These kind of robots are flexible as compares to fixed cameras.Video captured by robot can be seen on cellphone or desktop.

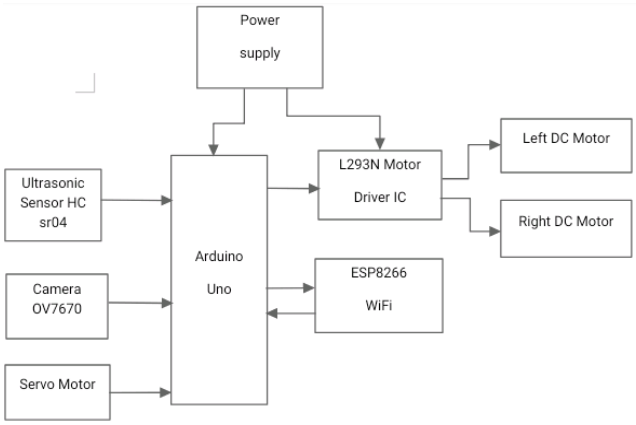

Figure 1. Block diagram

HARDWARE

1:Arduino Board

What is Arduino?

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board.Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can communicate with software running on your computer(e.g. Flash, Processing, MaxMSP.) The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

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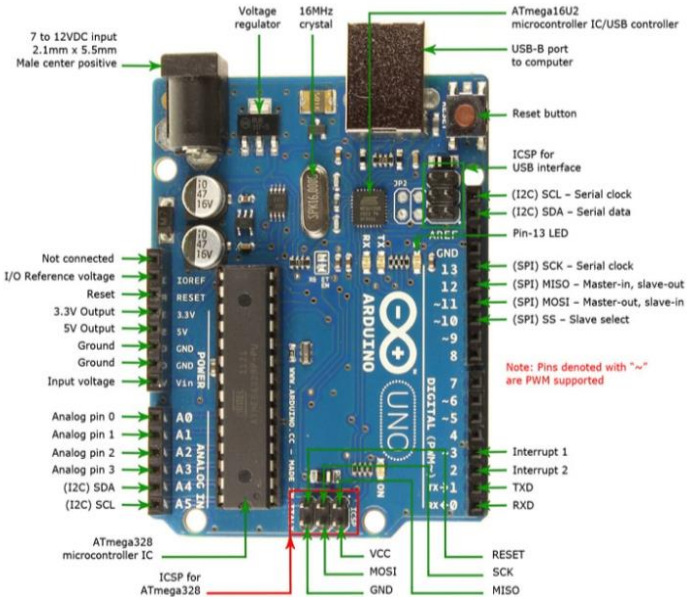

Figure 2 .Pin diagram of Arduino Uno

Microcontroller	ATmega168
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Table 1.specifiactions of Arduino Uno

2: **Ultrasonic sensor**

The ultrasonic sensor (or transducer) works on the same principles as a radar system. An ultrasonic sensor can convert electrical energy into acoustic waves and vice versa. The acoustic wave signal is an ultrasonic wave traveling at a frequency above 18kHz. The famous HC SR04 ultrasonic sensor generates ultrasonic waves at 40kHz frequency.

Typically, a microcontroller is used for communication with an ultrasonic sensor. To begin measuring the distance, the microcontroller sends a trigger signal to the ultrasonic sensor. The duty cycle of this trigger signal is 10µS for the HC-SR04 ultrasonic sensor. When triggered, the ultrasonic sensor generates eight acoustic (ultrasonic) wave bursts and initiates a time counter. As soon as the reflected (echo) signal is received, the timer stops. The output of the ultrasonic sensor is a high pulse with the same duration as the time difference between transmitted ultrasonic bursts and the received echo signal.

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FIGURE 3.ULTRASONIC SENSOR

3:L293D MOTOR DRIVER

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal to run four solenoids, two DC motors or one bi-polar or unipolar stepper with up to 600 mA per channel using the L293D. These are known as the drivers in the Ada fruit Motor shield. The L293 and L293D are quadruple high-current half-H drivers. In L293 is designed to provide bidirectional drive currents up to 1 A at voltage range from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltage range from 4.5 V to 36 V. Both the devices are designed to drive inductive loads such as relays, dc and bipolar stepping motor as well as other high-current/high-voltage loads in positive-supply applications. The Android application is basically divided into two modules i.e.

1. Video Streaming Module
2. Robot control module

A network camera or an Android mobile phone is mounted on the robot, which our application fetches the live video streaming display it. This video is achieved using WIFI technology.

The second module is the control module. Our application provides a GUI to control the robot wirelessly. This control is achieved using Bluetooth technology. Button are used to control the robot in forward, backward, left or right direction.

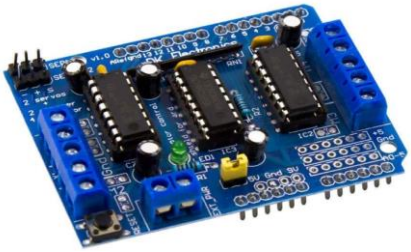

Figure 4 .L293D motor driver

4: OV7670 CAMERA MODULE

A camera module is an image sensor integrated with a lens, control electronics, and an interface like CSI, Ethernet or plain raw low-voltage differential signaling.

Figure 5. Camera module

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5: **ESP2866 WIFI MODULE**

WiFi module, also known as serial to WIFI module, which belongs to the transmission layer of IoT. The function is to convert serial port or TTL level into embedded module which can conforming to WiFi wireless network communication standard, with built-in wireless network protocol IEEE802.

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network.

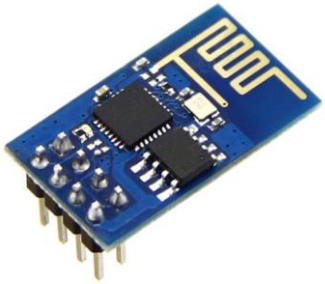

Figure 6.ESP8266 WiFi Module

6:Servo Motor:

Servo motors are proposed in controlling and control applications.They are used to adjust the speed at high torque and accurate positioning.These motors can be categorized according to servo motor controlled by servomechanism.

Figure 7.Servo Motor

7.DC Motor:

DC motor is use to drive robot for that we use 300 rpm 2 DC motors and DC motor is used to move the robot in left, right and forward and backward directions. L293D motor drive module controls the DC motor to move in the direction.L293D is designed to provide bidirectional drive current of up to 600mA .The direction of the movement is decided from the signals given by the obstacle sensors.RPM is inversely proportional to torque.

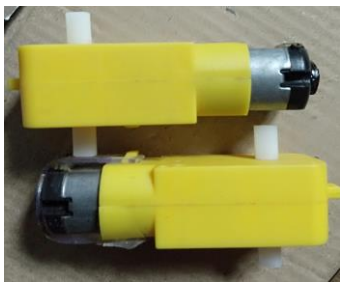

Figure 8.DC Motors

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OVERALL FLOWCHART:

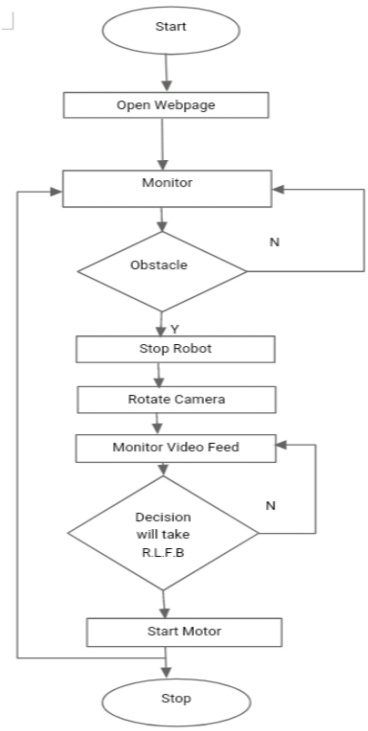

Figure 9. Flowchart

DESIGNING A WEBPAGE AND CREATING CLOUD:

Designing a webpage is main part of our project to control robot from any remote area. It will be necessary that to make one platform from there we will access our robot.from the webpage we control the direction of motor and position of camera as well as monitor the video feed.

CONCLUSION:

In this paper we implement a video surveillance robot for various applications such as security purpose, military applications etc.The video surveillance robot gives us live streaming video according to that we give the command.

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