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PORTABLE SURVEILLANCE ROBOT USING IOT

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ABSTRACT -*As the robotic technology continues to advance, robots are becoming capable of performing even more complex tasks. This paper defines about a surveillance robot scaling horizontal and vertical surfaces while automatically controlling surface transitions and provides the controlling for user with surveillance.to explore limited space and transmit live video through wireless channel to remote workstation. Wireless camera will send a real time video signals which could be seen on a remote monitor and action can be taken accordingly. Combining several existing technologies like wireless internet and hardware controllers into a system that can perform a job of security.*

KEYWORDS

Wi-Fi, surveillance, robot control, camera interfacing, Arduino UNO

1. INTRODUCTION

An embedded web server creates an easy way for monitoring and controlling any device which is at remote place. For designing such system, we require remote PC along with the internet connection. If internet connection is unavailable still we can use this unit using Wi-Internet of Things is the main concept in this field. The (IOT) Internet of Things is considered as the network of physical objects, devices, vehicles, buildings and other items which are embedded with electronics, software, sensors and network connectivity which enable all of these objects to collect and exchange data. Here the Integration with the internet implies that the devices will use an IP address as a unique identifier. The concept is about handling the things with the use of internet and the best model for these applications is Arduino. When the surveillance is considered, Arduino serve its purpose as it is good at connectivity by simply plugging Wi-Fi dongle into one of its port. With the rapid growth of the internet, more and more advanced devices or sensors have been embedded into it for performing the desired work, distributed computer systems, surveillance cameras, telescopes and manipulators.

2. LITERATURE REVIEW

[1] This paper presents about utilizing Wi-Fi that is a specification for wireless personal area network in which the device connection is wireless. They had used Atmega 32 microcontroller as it has advantage over 8086 microcontrollers.

[2] In this project, control of robotic unit is from remote end with the use of internet & also we are able to get the videos from robot end for surveillance purpose. Using this purposed technology, it gives a helping hand to our security forces in detection of intruders.

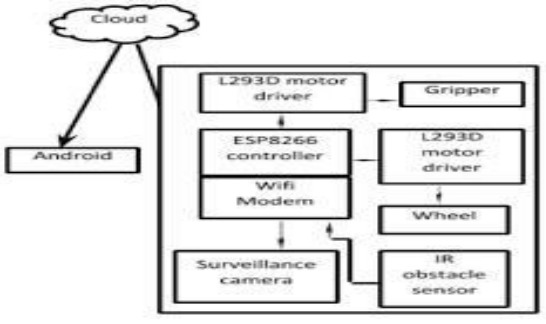
[3] This paper presents that one can control the robot from remote end. So that live streaming of video can be obtained. Limitation of range of operation does not arise.

[4] In this project, they used different kinds of standard protocols and machine-human interface. This system interface sensors with Arduino, interface with motor.

3. PROPOSED METHODOLOGY

In this project, one can control the robot from remote end say mobile or laptop with the use of Wi-Fi as well as internet and also the live streaming of video can be obtained from the robot for the purpose of surveillance, this video is obtained on web browser of the remote device from where we are operating the device and also the robotic movements are being controlled. Here the DC motors are being used for the movement of robotic wheels and stepper motor is used for camera movement. Arduino UNO is used for video processing and sending the processed video to user PC with the help of Wi-Fi as well as internet.in an existing system, the surveillance is not that effective.it only captures the real time images or videos but cannot take any actions for the suspicious activities. So, for this purpose humans are sent to such places hence their lives are not that secure. So proposed system deals with the development of a mobile capable of capturing real time images and videos for surveillance. The videos will be streamed live information will be provided to another workstation in very minute time as compared to the existing system, if anyone caught that robot then its whole content will be erased. Hence thereby securing the information.

4. BLOCK DIAGRAM



5. WORKING PRINCIPLE

Prototype consists of a camera module, voltage regulator circuitry with L293D motor driver and Arduino UNO. The real time video is displayed on the display which can be viewed from anywhere in the world using internet or within the Wi-Fi range and one can control it using the control provided.

Step 1: Setting up the Arduino UNO and installation of required packages.

Step 2: Write the controlling of the robot code based on the L293D IC logic.

Step 3: Connect the Wi-Fi dongle to connect Arduino UNO with Wi-Fi router. When it is connected with the wi-fi router IP address can be found.

Step 4: once we got the IP address we can use it for the controlling purpose.

Step 5: Now build the robotic unit we can use DC motor based simple robot.to control the motors L293D is needed.

Step 6: Connection of power supply. Arduino UNO gets turn on as soon as power is supplied.

Now the live streaming of the video can be viewed and robot can be controlled from anywhere in the world.

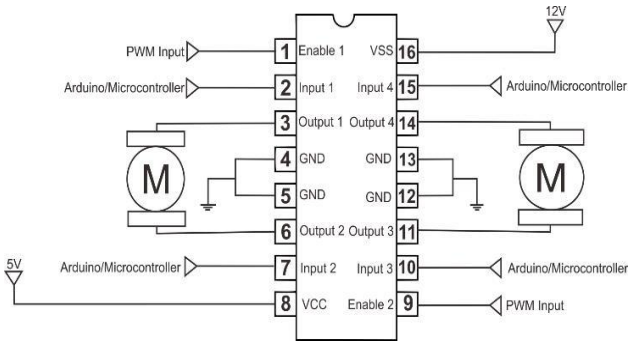
5.1. Arduino UNO

Arduino is a single-board microcontroller make the application more accessible which are interactive objects and its surroundings. The hardware features with a hardware board designed for an 8-bit Atmel AVR microcontroller or a 32-bit Atmel ARM. The Current model consists of a USB interface, 6 analog input pins and 14 digital I/O pins that allow the user to attach various extension boards. This board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, an ICSP header, 16mhz ceramic resonator a USB connection, 6 analog inputs, a power jack and a reset button.

This board contains all the required support needed for microcontroller. They are simply connected to a computer with a USB cable or with an AC -to-DC adapter or battery in order to get started. This Board varies from all other boards and they will not use the FTDI USB-to-serial driver chip in them. It is featured by the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Test, sensors, actuators, and electronic components on a common silicon substrate through micro-fabrication technology. The electronic components are fabricated using integrated circuit process sequences (e.g. CMOS, Bipolar, or BICMOS processes). The micromechanical components are fabricated using compatible "micromachining" processes in which selected parts of the silicon wafer can be etched. Also, it can add new structural layers to form the mechanical and electromechanical.

5.2. L293D MOTOR DRIVING MODULE

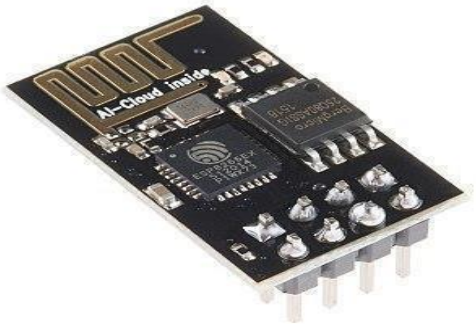
The L293D is quadruple high-current half- H drivers. It is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both of these devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage y loads in positive-supply applications. All inputs are TTL compatible. Each of the output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo- Darlington source. Drivers are enabled in pairs, with the drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the drivers which are associated are also gets enabled, and their corresponding outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their corresponding outputs are off and in the high-impedance state. With the proper data inputs, each pair of those drivers forms a full-H (or bridge) reversible drive suitable for either a solenoid or motor applications.



5.3. ESP8266Module

The ESP sends the sensed output voltage on server using Wi -Fi network created by itself. The data which is being transmitted on server can be observed on laptops or mobiles by connecting to that Wi-Fi server and accessing the IP address. The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (microcontroller unit) Shanghai-based Chinese manufacturer, Espressif Systems. Firstly, the chip came to the attention of

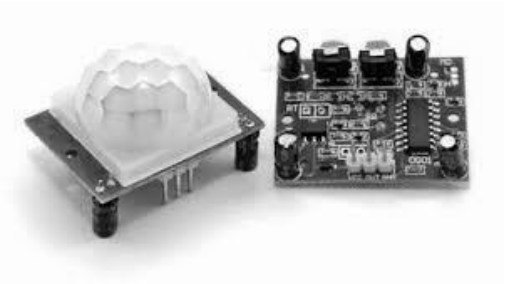
western makers in August 2014 with the ESP -01 module, made by a third-party manufacturer, Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and will make simple TCP/IP connections using Hayes-style commands. However, at the time when there was almost no English-language documentation on the chip and the commands it accepted the very low price and the fact that there were only a very few external components on this type of module which are suggested that it could be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate into the Chinese documentation. The ESP8266Wi-Fi Module is a self co SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi- Fi network. The ESP8266 is very much capable of hosting an application or offloading all Wi- Fi networking functions from another application.



Each ESP8266 module comes pre- programmed with a AT command set firmware, meaning, it can simply hook this up to the Arduino and get about as much as Wi-Fi Shield offers. The ESP8266 module is a cost-effective board with a huge, and ever growing, community. In this module, it has a special on- board processing and storage capability which allows it to be integrated with the sensors and other application specific devices through its GPIOs with the minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, which is mainly designed to occupy minimal PCB area including the front-end module. The ESP8266 will support APSD for VoIP applications and Bluetooth interfaces, it contains a self-calibrated following it to work under all operating conditions, and requires no external RF parts.

5.4. PIR SENSOR

A passive infrared sensor (PIR Sensor) is an electronic sensor which is used to measure infrared (IR) light radiating from objects in its field of view. They are mostly used in PIR based motion detectors. All the objects with the temperature above absolute zero level will emit energy in the form of radiation. Usually this type of radiation is not visible to the human eyes because it radiates at infrared wavelength, but it can be detected by the electronic devices designed for such a purpose. The term 'PASSIVE' in this instance refers to the fact that PIR devices do not either generate or radiate energy for the detection purpose. They will work entirely by detecting infrared radiation that is radiated heat emitted by or reflected from the objects.



5.5. Arduino IDE

Arduino is a micro-controller development board series - Uno, Nano mega etc. Now, any micro-controller (here it is at mega 328 IC on the Arduino Uno or at mega 1280 on Arduino Mega) that needs to be programmed and it is fed with a hex code version of the code written in high level (English) language. So, Arduino development boards are fed with the code via Arduino IDE.

IDE (Integrated Development Environment) is a software that enables better and assisted code editing, compiling and debugging. The Arduino IDE works on the Java Platform. You can co-relate this to Eclipse, the language java has different IDEs that ease the usage of the language for a particular purpose. However, Eclipse do not support the functions and commands that work on Arduino board. So, this Arduino IDE has inbuilt functions and commands that though work on Java platform, are customised to run on the Arduino development.

6. CONCLUSION

In our project, the robot is designed to move by our command and also by its own according to the command given by the program. The video is monitored at the control unit. In this prototype project, the robot is designed in such a way that it can be moved anywhere and it can get the information of particular place. It is easy to detect any fault in that specified area. It leads easy process without interaction of humans. This project is very much useful in the places where a human cannot go into the places like canals, smoke-oriented caves and it will be very much useful in such situations.

7. FUTURE SCOPE

We can make this system completely autonomous by adding a feature to localize in environment and to make use of its own map. Solar charging function can be added to this system in order to save the power. It can be utilized in 4G network for better performance.

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