Robot Controlled Car Using Wi-Fi Module

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Abstract: In this paper, we will deliberate how to control robot controlled car using Wi-Fi module through android application of an android mobile phone. We will also show that we can control the appliances even in the absence of an android phone by sending a normal SMS. The advantage of using robot controlled car is it can be used for various purposes likeThis project can be modified quite easily to include a spy camera as well that can stream the videos to the user over Wi-Fi.Attempts would be made to use solar cells instead of the regular lithium-ion battery for the project. This robot car can also be used to push the objects from one place to another. This project will be enhanced with better Wi-Fi which would enable long distance communication.

Keywords: IDE, UART, ADC

I.   INTRODUCTION

A robot is a machine designed to execute one or more tasks repeatedly, with speed and precision. There are as many different types of robots as there are tasks for them to perform. A **robot** is a mechanical or virtual artificial agent, usually an electro-mechanical machine that is guided by a computer program or electronic circuitry. Robots can be autonomous or semi-autonomous. Robots have replaced human in performing repetitive and dangerous tasks which humans prefer not to do, or are unable to do because of size limitations, or which take place in extreme environments such as outer space or the bottom of the sea.

Wi-Fi is "short for wireless fidelity and is meant to be used generically when referring of any type of 802.11 network, whether 802.11b, 802.11a, dual-band, etc. The term is promulgated by the Wi-Fi Alliance.Wi-Fi networks consist of transmitting specific radio waves to wirelessly connect computers to each other, to the Internet, or to wired networks. "The signals can be picked up by specially enabled notebook computers (through either built-in or added-on network components). Computer manufacturers offer notebook computers with built-in Wi-Fi capability and any standard notebook computer can easily become Wi-Fi enabled by simply plugging in an appropriate Wi-Fi network card (also known as a PCMCIA card).This new technology allows for Internet users to connect nearly 50 times faster than standard modem dial-up.

If both Wi-Fi technology and robot are introduced together it will bring a great advantage. Thus we will be able to operate the robot with the help of Wi-Fi and can make hi do whatever we wish to.

Existing System

Now a days due to advancement in technology various newly designed smart homes make use of Wi-Fi enabled robot for various applications. Mostly they are used for home security purpose. Thus one can keep an eye on the people coming inside home just by the robot car just by introducing a camera into it.

Various other application are also done by this robot car like doing various works on the command ex- switching on the lights when the robot is given command by the Wi-Fi enabled device.

Proposed System

The robo car can be easily moved from one place to another just by a single device. Robo car can be used for security purpose with the installation of a camera. We can make the car do various task like moving an object from one place to another without applying any physical force.

II.   SYSTEM SPECIFICATIONS

2.1 Scopes and Purpose of System Specification

The system specification shows the description of the function and the performance of system and the user. The scope of our project "Based control system" is immense. The future implications of the project are very great considering the amount of time and resources it saves. The project we have undertaken can be used as a reference or as a base for realizing a scheme to be implemented in other projects of greater level such as smart homes, various robot contolled industries etc.

2.2 Goals and Objectives

The project "GSM based Control System" at the title suggests is aimed to construct a control system that enables the complete control of the interface on which it is based. General objectives of the project are defined as; a. To co-ordinate appliances and other devices through Short Message Service (SMS). b.
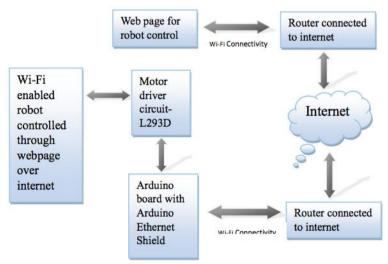
Fig.1 Functional block diagram of Wi-Fi Robot

To effectively receive and transmit data via SMS c. To eliminate the need of being physically present in any location for tasks involving the operation of appliances within a household/office. d. Minimize power and time wastage 2.2 Operating Environment The control system will include two separate units: the cellular phone, and the control unit. There will therefore be two operating environments. The cellular phone will operate indoors and outdoors whereas the control unit will operate indoors within the temperature and humidity limits for proper operation of the hardware. GSM Based Control System 11

2.3 Intended Users and Uses

Robot car controlled by Wi-Fi will make our work much more easier as we can make the robot do any work we need by just a single movement on our mobile phone on computer.In near future we can see such designs getting too common and being used extensively for household purposes

2.4 Assumptions

Certain assumptions have to be made in order to implement our project. The list of assumptions for our project is;
a. The user and control unit will establish communication via GSM
b. The cell phone and service provider chosen will support text messaging service.
c.   The user is familiar with the text messaging program on their cell phone.
d. All service charges (standard messaging rates) from the service provider apply.
e. The controlled appliances can and will have to have an electrical interface in order to be controlled by the microcontroller.

III.   SYSTEM DESCRIPTION

The system has two parts, namely; hardware and software. The hardware architecture consists of a stand-alone embedded system that is based on ATMEGA 328 adruino board which is a 28 pin IC. It also consist of l293d which is a motor driving IC and ESP8266 which is a Wi-Fi module

3.1 Hardware Used

The following hardware is used in the project which is explained as follows:-

3.1.1 Adruino Uno (Or Its Equivalent)

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in aseries of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

L293D

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D.

12V DC Geared Motor

The 12V DC Geared Motor can be used in variety of robotics applications and is available with wide range of RPM and Torque.

Specification:
- Length: 80mm
- Torque: 1.5 kg.cm
- Shaft Diameter: 6mm
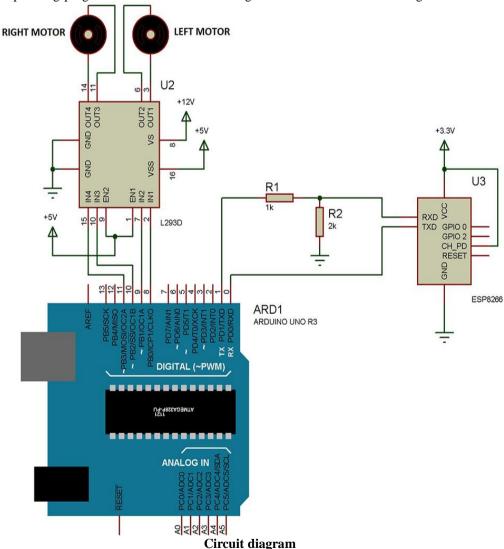- Weight: 130.00g

Other Components Used:
Castor Wheel
Wires
Breadboard
Small PCB
Male headers
Female headers

3.2 Software used
3.2.1 Arduino
The open-source Arduino environment allows user to write code and upload it to the I/O board. The environment is written in Java. The Arduino development environment contains a text editor for writing code, message area, text console, and toolbar with buttons for common functions, and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. Arduino programs are written in C or C++. Arduino features, capable of compiling and uploading programs to the Board with a single click. Software written using Arduino is called sketches.

Circuit diagram

3.3 Functioning
The circuit is built around an ATmega328 controller, ultrasonic transceiver module HC-SR04, Bluetooth module JY MCU BT, motor driver L293D (IC1), DC motors M1 and M2, and a few common components. Thecircuits uses two 9V batteries-one to power the ATmega328 controller and the other to power the motors. Regulated 5V supply for the restof the circuit is provided by the ATmega328 controller itself. LED on the board indicates presence of power supply.
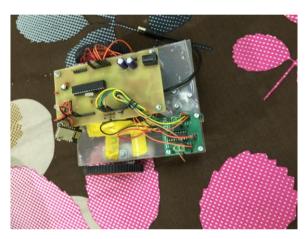
A. Bluetooth module The module provides a method to connect wirelessly with a PC or Bluetooth phone to transmit/receive embedded data such as GPS data, ADC voltage reading and other parameters. Bluetooth module JY MCU BT used in the project can be connected to any device, via built in UART interface to communicate with other Bluetooth -enabled devices such as mobile phones, handheld computers and laptops. The module runs on a 3.6V to 6V supply.

For the home security system we are using ultrasonic sensor which will check the distance between the two points. If some intruder passes between the two points then the distance between the two points would decrease. The feedback of the distance is send back to the microcontroller. The microcontroller would send a feedback SMS to the owner through GSM modem and will also ring an alarm. The advantage in using this safety and security system is that the certain range at which the alarm rings and SMS is send is user defined so user can select any range accordingly at which the microcontroller will report.
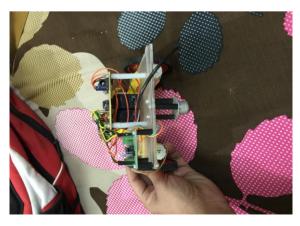
IV. CONCLUSIONS

This has been a brief review of several wireless technology usages that might be used to control mobile robots. It is important to compare this technology and the bandwidth, frequency, data rate to transfer data among the devices for better development for mobile robot controller. All we need to do is to focus on how to bring the different characteristics of all the wireless technologies together in one portable application. Selection of wireless technologies depends on the type of application to be developed considering the following; range, frequency and data rate.

Photos

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