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Android Controlled Robot for Monitoring the Visually Challenged

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Abstract: ***In the present generation the gap between machines and humans is being condensed with the introduction of new technologies to free from trouble the standard of living. This paper analyses the motion technology to capture motions through an android smart phone with an inbuilt accelerometer and Wi-Fi module to control the movements of a robot. In addition to that DTMF (Dual Tone Multiple Frequency) is also used for controlling the motion of the robot according to the variation of the frequency ranges. Sensors placed on robot continuously update the temperature and gas values of surrounding area and display on LCD. The signals of the Wi-Fi Module are controlled by the Arduino. Also a camera is equipped for remote view and the robot will avoid obstacle and move when it is in operation without intervention from the operator. This proposal is mainly used to monitor the visually challenged.***

Index Terms - Arduino, WI-FI technology, Temperature sensor, Gas sensor, Android, Accelerometer sensor, DTMF, AirDroid.

I. INTRODUCTION

A robot is a machine designed to implement one or more task repeatedly, with speed and precision. A robot is a mechanical or practical artificial agent, an electro-mechanical machine that is guided by computer program or electronic circuitry. Robots have replaced human in performing repetitive and dangerous tasks which human prefer not to do, or are unable to do because of size limitations, or which takes place in extreme environment such as outer space or the bottom of the sea. Robots are used in dangerous environments (including bomb detection, and de-activation and monitoring visually challenged), manufacturing processes or where humans cannot survive. Based on the experience and some research which have been done previously, this research developed a system to control robot motion, in accordance with the tilt of accelerometer sensor as well as DTMF for android smart-phone. The accelerometer sensor is a sensor that can measure the acceleration due to gravity and vibration. DTMF stands for Dual Tone Multiple Frequency. There are certain frequencies that we use to create DTMF tone. In simple words by adding or intercourse two or more frequencies generates DTMF tone. Then the robot can able to move left, right, forward and reverse directions.

II. CONCEPT OF SYSTEM

The control of robot movement which is developed in this study is the control of motion direction of the robot. They are right, left, forward and reverse direction.

The robotic motion can be controlled through the Wi-Fi technology which is enable for long distance communication. The signals of the Wi-Fi module are controlled by the Arduino Uno.

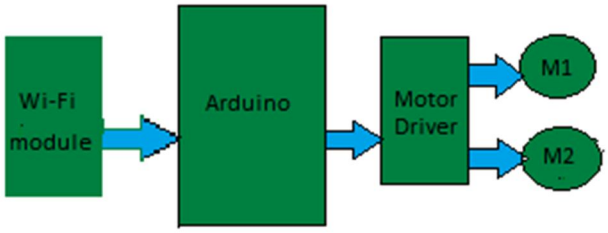


Fig1. Concept of System

Wi-Fi technology may be used to provide Internet access to devices that are within the series of a wireless network that is attached to the Internet. This WI-FI module is connected to an arduino. The Arduino Uno is a microcontroller board based on

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the ATmega328. It contains everything needed to care the microcontroller; simply connect it to a computer through a USB cable or power it with a AC-to-DC adapter or battery to get started. L293D is a typical Motor driver or Motor Driver IC which permits DC motor to drive on either direction. L293D is a 16-pin IC which can switch a set of two DC motors simultaneously in any direction.

III. BLOCK DIAGRAM

A. *Hardware*

The proposed system consists of Android smart phone, laptop and robot containing various sensors and modules.

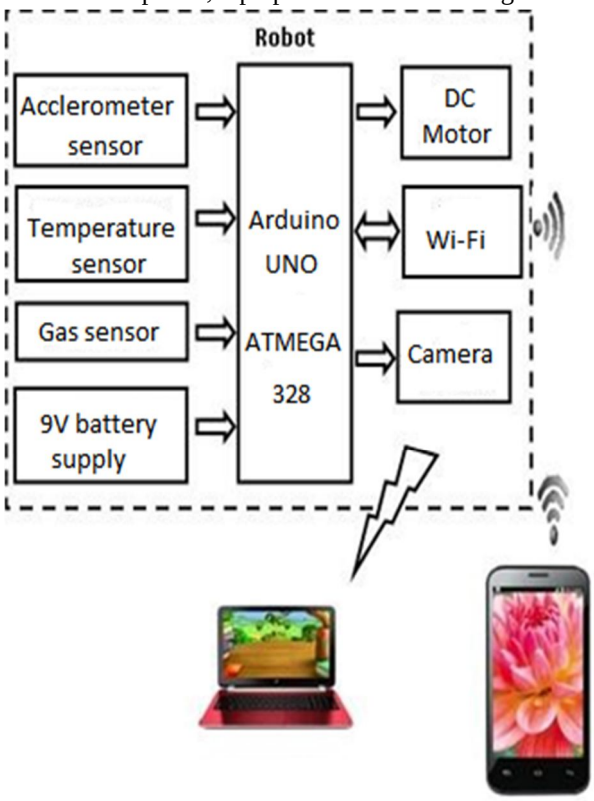


Fig 2: Block diagram of proposed system

In figure 2, At initial it scans for the Wi-Fi device with the available device. The input character from the android app is transmitted by Wi-Fi adapter present in the phone to the Wi-Fi module on the robot by tilting accelerometer sensor in any directions, then robot moves in that particular directions. Similarly from Wi-Fi module, temperature and gas updates are displayed on lcd. Also robot continuously monitors surrounding area by camera and display image or video on laptop.

B. *Arduino Uno*

The Arduino Uno is a 8 bit microcontroller board grounded on the ATmega328.It has 14 digital pins and 6 analog pins and additional power pins such as, GND, VCC. It takes 14 digital input/output pins (of which 6can be castoff as PWM outputs), six analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It has SRAM 2kb plus flash memory 32kb. EEPROM with 1KB. Arduino is undefended source hardware board with numerous open source libraries to interface it on board microcontroller with numerous other external components like LED, motors, IR sensors and various other things one want to interface with Arduino board. Arduino is a complete board which include all things to connect with exterior peripheral and to program through computer. The Arduino circuit acts as an interface between the software part and the hardware part of the project.

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C. Android Phone

In this project we will control the robot using Android Phone by pressing the keypads. Different directions will be set for each keys. According to that the robot will be moved for all the directions like front, back, forward and reverse. In that an application named Webofcam is used for remote view.

D. Wi-Fi Module

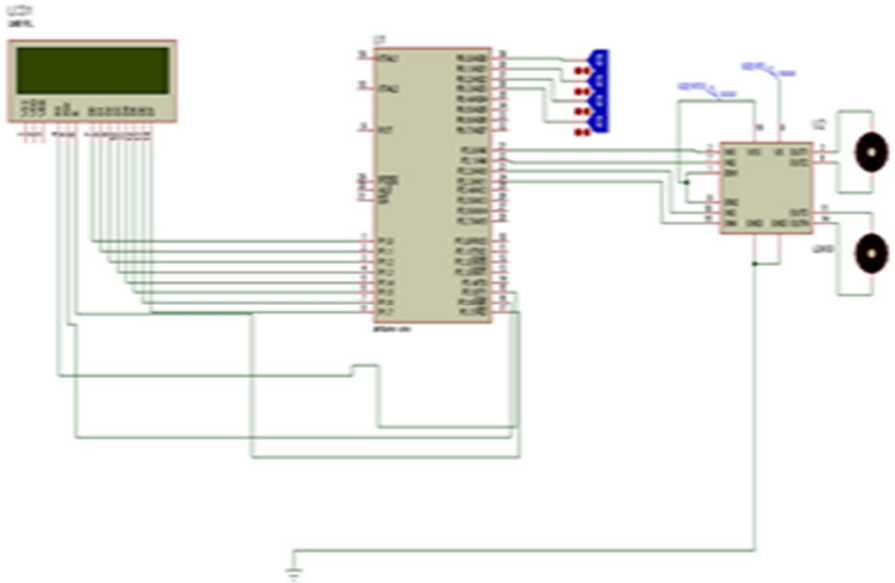
1) 2.4 GHz 802.11 b/g/n compatible.
2) Support IEEE 802.3, IEEE 802.3 u.
3) Range of Baud rate -1200-500000bps.
4) Wi-Fi client/AP/Router mode.
5) Support transparent transmission mode.
6) Benefits in Home, commercial building automation
7) Use in telemetry, industrial system, toys and gaming peripherals.

E. Sensors

The D203S is a pyro electric infrared sensor detects infrared radiation on the source of the characteristics that the polarization of pyro electric material changes with temperature. It has high sensitivity and strong stability. It is used to build many kinds of security alarm systems and motion detectors. [5]The ADXL335 is an accelerometer sensor which is small, thin, low power, complete 3 axis accelerometer with signal conditioned voltage outputs. It has excellent temperature stability and requires a voltage of 1.8V to 3.6V and power of 350µA. Bandwidths with a range of 0.5Hz to 1600Hz for the X & Y axes and 0.5Hz to 550Hz for Z axis and it is mainly used in mobile devices, image stabilization and disk drive protection.

F. Simulation Software

1) Proteus is a simulation and design software tool developed by lab center electronics for electrical and electronic circuit design.
2) It is a software suite containing schematic, simulation as well as PCB designing.
3) ISIS (Intelligent Schematic Input System) is the software used to draw schematics and simulate the circuits in real time.
4) Commonly used for digital simulations such as microcontrollers and microprocessors.
5) It can also simulate LED, LDR, USB communications.



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G. Application Software

1) Webofcam is an application software used to view the images and videos in both transmitter and receiver side.
2) In transmitter side the camera mode and in receiver side viewer mode is used.
3) Stable video streaming at high quality.
4) Automatic camera discovery and pairing.
5) No need to enter the IP of your wireless camera manually.
6) It allows us to capture pictures and videos from your android phone or tablet to a computer, without using a USB cable.
7) Simultaneous connection from multiple viewers.
8) It is a popular remote access management tool for Android devices that allows us to view the latest videos.

IV. CONCLUSION

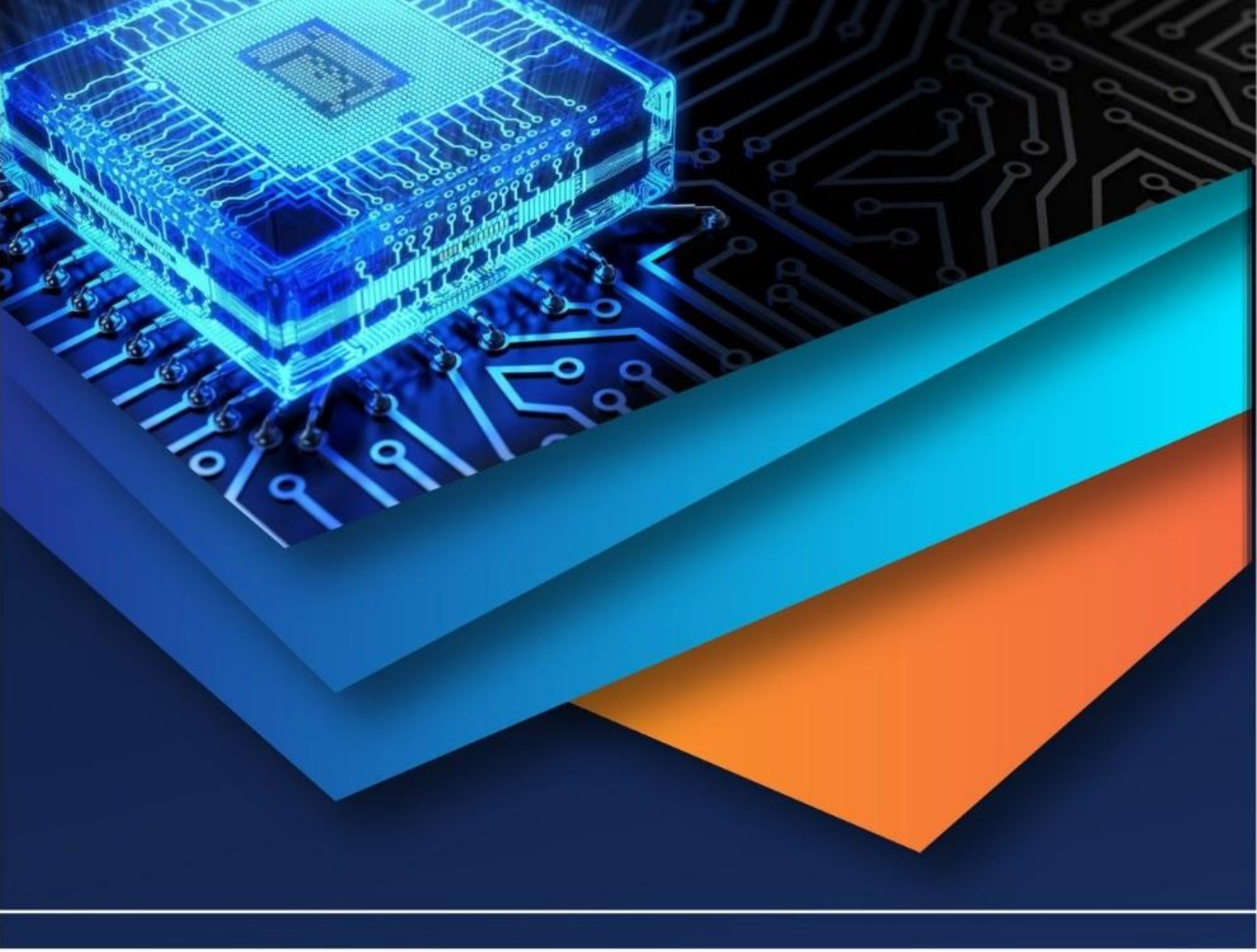
Through this project we were able to make a better surveillance system by setting a camera on the robot and transferring the images to the connected Smartphone. Connectivity between the robot and the Smartphone is made possible through Wi-Fi technology. Also we could relocation data between robot and the Smartphone easily and efficiently. It could also take images from places where humans cannot enter. This works better than traditional surveillance system that was done using fixed cameras at different positions. Since camera is placed on the moving robot vehicle it could take pictures all around its vicinity.

Future work on this project will be devoted to make the robot more effective, efficient and usable. By using more sensors we would enhance the applications into various sectors. Some of the sensors can be light sensors which could determine presence of light in a place where humans cannot enter and also a microphone which can be used to record voices as well.

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