Android Wi-Fi Controlled Robot

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***Abstract*— A wide variety of applications in the present age need the use of robots as opposed to humans. Robots can perform tasks which are hazardous for humans or inaccessible to them. The basic idea of this system is based on the problems that are related to the above fact. Designing an unmanned vehicle that can be controlled via remote device and move in places where humans might not be able to reach shall solve many problems of applications such as spying, surveillance, search and rescue and also in the domain of science and research. By making use of rapid growing technology in robotics and automation a robot which can be controlled by a cellular phone equipped with WIFI network, which acts as a wireless communication link between the robot and the cellular phone, has been designed.**

Keywords*—Surveillance, remote device, robotics and automation, wireless communication, hazardous or inaccessible.

I. INTRODUCTION

A robot is a software controlled mechanical device that uses sensors to guide one or more end effectors through programmed motions in a work space in order to manipulate physical objects. Robotics is the study of robots defined as the combination of machine tool technology and computer science and is a form of Industrial Automation and is a technology with a future and for the future. It is a branch of technology that deals with the design, construction, operation and application of robots and computer systems for their control, sensory feedback and information processing. [1,2] It is a rapidly growing field, as we continue to research, design and build new robots that serve various practical purposes, whether domestically, commercially or militarily. Capacity provided realistic opportunity for new robot controls and realization of new methods of control theory. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent robots using new robots control devices, new drivers and advanced control algorithms. This project describes a new economical solution of robot control systems. The presented robot arm control system can be used for different sophisticated robotic applications.

fig.1.1: Android controlled Wi-Fi robot.

II. RELATED WORK

1) A Wireless Controlled Surveillance Robot is a robot that is capable of carrying out a complex series of actions automatically, specifically programmable for the required task. A robot can also be controlled by a human operator from a far off place.[7]

2) The project mainly aims on how to build an autonomous robot in this case a Pick and Place Robot using Line Tracking. This project proposes three main parts which are electric circuit, mechanical design and programming. To build a good autonomous robot, the robot must also be very easily andfreely controlled by the user to make sure it can perform well. Generally, this robot will be used to pick and place objects, for some applications like moving a container from one area to another in a factory or placing components onto the PCB's. The robot uses several sensors to guide the direction which has been lined with black tape and the robot

uses several motors for moving. This project focuses on the usage of PIC controller, a motor for motion and sensor for line tracking. The robot functions are fully controlled by a software program. [8]

3) The project deals with the wireless sensor-based remote control of mobile robots motion in an unknown environment with obstacles using the bluetooth wireless transmission and Sun SPOT technology. The Sun SPOT is designed to be a flexible development platform, capable of hosting widely differing application modules.[9]

4)In the before technology they were many methods used to design and implement, and also differentAlgorithms were used for navigating the mobile robot. Unlike bar codes, no clear line of sight is required to obtain an accurate read. As the bar codes were high of cost we are using the RFID Tags. The most common and popular navigation techniques suggested in the state of the art generally fall under one of the following categories: map-based technique, dead-reckoning-based technique, landmark-based technique, vision-based technique, and behavior-based technique. Each navigation technique has its own advantages and disadvantages.[10]

III. METHODOLOGY

The project aims at designing a Robot which is controlled through Android phone over Wi-Fi technology. The Robot can be moved in all the four directions (front, back, left and right) through predefined keys assigned in the android application. This project describes a new economical solution of robot control systems. The presented robot arm control system can be used for different sophisticated robotic applications. The controlling device for the robotic controlling in the project is a Microcontroller. The data sent from Android mobile phone over Wi-Fi will be received by Wi-Fi module connected to Microcontroller.

IV. FEATURES

- Wi-Fi based user-friendly interfacing.
- Usage of Android phone's Wi-Fi
- Low power consumption.

The project focuses on the fallowing advancements:

- Wi-Fi technology.
- Interfacing Wi-Fi module to Microcontroller.
- DC motor working and need for motor driver.
- Embedded C programming.
- PCB designing.

The major building blocks of this project are:

- Regulated Power Supply
- Micro Controller.
- Wi-Fi module.
- DC Motor with driver.
- Crystal oscillator.
- Reset.
- LED indicators.

Software's used:

- PIC-C compiler for Embedded C programming.
- PIC kit 2 programmer for dumping code into Micro controller.
- Express SCH for Circuit design.
- Proteus for hardware simulation.
- Block diagram:

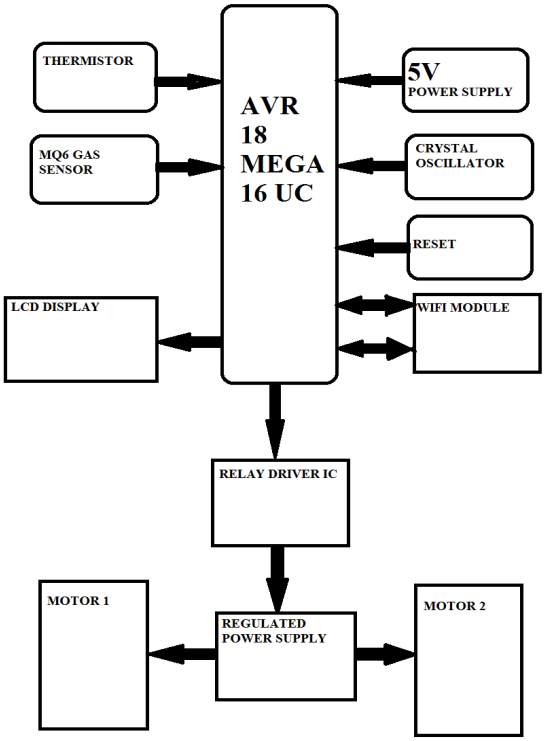

fig.1.1: Block diagram of Wi-Fi robot.

Power source is used for driving the vehicle, we are using a 12 volt rechargeable battery which gives the maximum speed and torque. The Arduino board and Ethernet Shield are energized by a 5 volt battery which synchronizes with its operating voltage. Hence we are using dual power source to meet our requirements. Clock crystalprovide the clock signal of very high speed frequency of 11.0592. Wi-Fi Module is used for the communication through which data is sent and received. Relay driver ICULN2803 is an Integrated Circuit (IC) chip with a High Voltage/High Current .It allows you to interface TTL signals with higher voltage/current loads. A TTL signal operates from 0-5V, with everything between 0.0V and 0.8V considered "low" or off, and 2.2V to 5.0V being considered "high" or on. It helps in triggering the signal and the signal is amplified. Sensor: temperature is detected through the thermistor and the LCD displays: it uses for displaying the all the temperature and gas value. In Motors 1 and Motors 2 there is need of 12V DC Regenerative PM motor. From here 12 V battery is converted to 5V battery through the step down transformer for microcontroller. Microcontroller ATmega 16AVR is 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum

frequency of 16MHz.ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD.

A)Robot assembly and basic platform testing

1.Assemble VEX frame,

2.Mount wheels and drive system,

3.Mount main control board,

4.Get Wi-Fi working,

5.Basic mobility code,

6.Field testing, to ensure stable design.

B)On-Board autonomous setup and testing

1.Add bumper sensors, compass, and other sensors to aid in autonomous action

2.Simple autonomous sensor tests

3.Field testing, to ensure stable design.

C)Android app creation

1. Build an app that can provide inputs for motion control.

2. Simulate this interaction on a computer, by testing each input against an output printed to screen.

3. Integrate with the robot.

4.Field testing, to ensure stable design.This is an iterative approach that we believe will ensure that at each stage of testing, we will have a functioning robot that achieves a major goal. We believe that this approach will ensure that we both have a solid robot at the time of project delivery while also ensuring that we do not over extend ourselves in attempting to do too much, as we will have to check our progress against our benchmarks.The robot is being built from a basic VEX platform. This gives us flexibility in design of the robot without having to worry about fabricating a large number of additional parts. With the VEX kit we can easily get a functioning robot built and controlled via radio controls, which allows us to focus on the more difficult aspects of this project, which will be the development of the Android app and the integration of the Android device and the Vex micro-controller.

IV. ARCHITECTURE

- *Robot hardware*

Our mobile robot is constructed using commercial off- the-shelf (COTS) components available from VEX Robotics.

- *Cortex Microcontroller*

The Cortex Microcontroller is built around an ARM Microprocessor running at 90 million instructions per second (MIPS), together with 384 KB of flash memory. For I/O, the Cortex features 10 motor ports, 12 general-purpose digital ports, 8 analog ports, 2 UART serial ports, and an I2C port Unlike the cheaper PIC-based VEX microcontroller, the Cortex features a USB port for both programming and the Wi-Fi link.

V. FUTURE SCOPE AND CONCLUSION

- *Future Scope:*

1) Multiple sensor can be added.
2) Size and shape can be modified as per requirement.
3) It is rapidly growing field, as we continue to research design and build new robots that serve various practical purposes, whether domestically, commercially, militarily.

- *Conclusion:*

By controlling the Bluetooth, limits the range of distance for communication. Easiest mean as it requires to access the designated web page. This system can be used in defense applications for detecting landmines. The size of device can be changed according to one's requirement.

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