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Wi-Fi Based Robotic ARM Control Using Raspberry PI Processor

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ABSTRACT:
This paper proposes a method for controlling a Robotic arm using an application build in the android platform. The android phone and raspberry pi board is connected through Wi-Fi. As the name suggests the robotic arm is designed as it performs the same activity as a human hand works. A signal is generated from the android app which will be received by the raspberry pi board and the robotic arm works according to the predefined program. The android application is the command centre of the robotic arm. The program is written in the python language in the raspberry board. The different data will control the arm rotation.

Keywords: ***Robotic Arm, Raspberry pi, Android Application and wi-fi.***

I.INTRODUCTION:

Robots are increasingly being integrated into working task to replace humans especially to work on repeated actions. In general robots can be classified into different fields industrial and service robotics. Service robots is a robot which performs semi or fully autonomously to perform services usefully for the well being of humans and equipments, excluding manufacturing operations.On the other hand internet and WI-FI are becoming most common resource for everything. People like to buy things online rather than getting them manually Internet is now everywhere, compare to the last decades where internet is only wired, and people needs to be in front of the computer to access the internet but nowadays, internet is just at the tip of your finger. This is an advantage where we can to introduce robot to household works. The robot body is build mechanically and electrical components were also used to build the robotic arm. Mostly the internet controlled robots will be wired these wired robots have some space limitation. So to avoid the limitation, the robotic control is made wireless that is, it is controlled by Wi-Fi. Wirelessly also means using Bluetooth but the advancement used here is the WI-FI which is most widely used nowadays. The raspberry pi is a credit-card-sized single-board computer which is developed by the UK based Raspberry Pi Foundation..The Raspberry Pi has 17 GPIO pins. Using L293 motor driver boards, the Robotic Arm is controlled through the GPIO pins. A USB camera (i-Ball) is used for visual feedback by providing live video streaming through the Wi-Fi. The robotic arm is then controlled from an Android application build in android platform in a smart phone. Through the wifi connection the control is given to the robotic arm. This robotic arm can be controlled through a smart phone and RASPBERRY PI acting as communication media between them. An android applications is developed in the android platform.Here Android application being the command centre of the robotic arm as it commands the arm to move or grab specific things as the instruction is transferred to the arm through android JAVA language. The controlling board that is the Raspberry Pi has 17 GPIO pins. Using L293 motor driver boards, the Robotic Arm is controlled from the GPIO pins.

II. RELATED WORK:

2.1 BLOCK DIAGRAM:

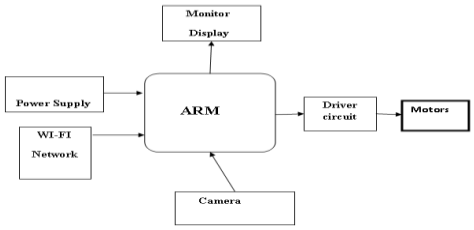

Figure-1: Block Diagram of project

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2.2 EXISTING METHOD:

In the existing system the Lab monitoring system is design and controlled by using RF technology which can monitor and control the system inside the lab only in places where network availability is more. They are bit more costly because cost of components is increased. Not so easy to implement as you have to take great care of noise, Because of antennas it is bulkier.

2.3 PROPOSED METHOD:

The proposed method is used to overcome the drawbacks present in existing method. The controller transmits the data to remote mobile through Wi-Fi. Once data is placed at mobile we can view the data at remote mobile with Wi-Fi on android application. We can view continuous streaming of video as well as control the robot using android application.

III. HARDWARE COMPONENTS:

3.1 RASPBERRY PI PROCESSOR:

Figure-2: Raspberry Pi diagram

The Raspberry Pi board involves a processor and snap shots chip, Random Access Memory (RAM) and more than a few interfaces and connectors for external devices. Some of these instruments are main others are optional. It operates in the identical method as a ordinary pc, requiring a keyboard for command entry, a show unit and a vigor give. considering that raspberry Pi board operates like pc it requires 'mass-storage', but a tough disk pressure of the variety observed in a ordinary pc is not relatively in maintaining with the miniature dimension of Raspberry Pi.

3.2. DC MOTOR:

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

3.3 HTTP (HYPER TEXT TRANSFER PROTOCOL):

The WEB Internet (or The Web) is a massive distributed client/server information system as depicted in the following diagram.

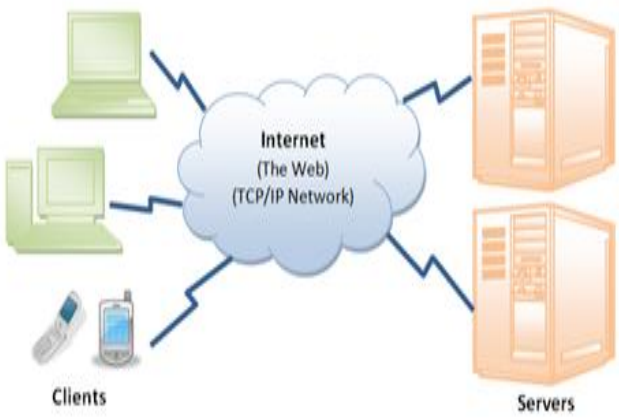

Figure-3: HTTP protocol

Many applications are running concurrently over the Web, such as web browsing/surfing, e-mail, file transfer, audio & video streaming, and so on. In order for proper communication to take place between the client and the server, these applications must agree on a specific application-level protocol such as HTTP, FTP, SMTP, POP, and etc.

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IV. RESULTS:

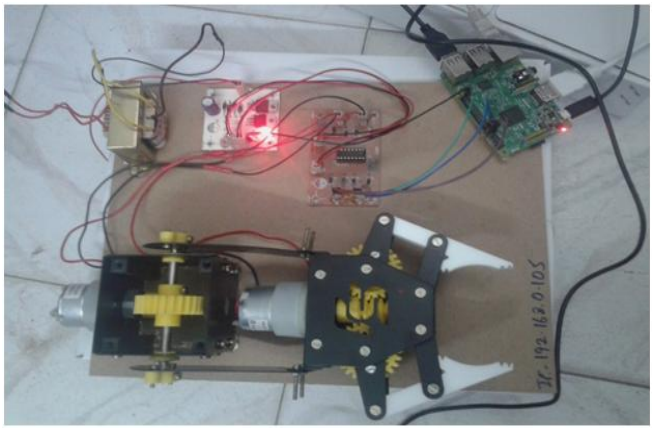

Figure-4: Hardware of the project

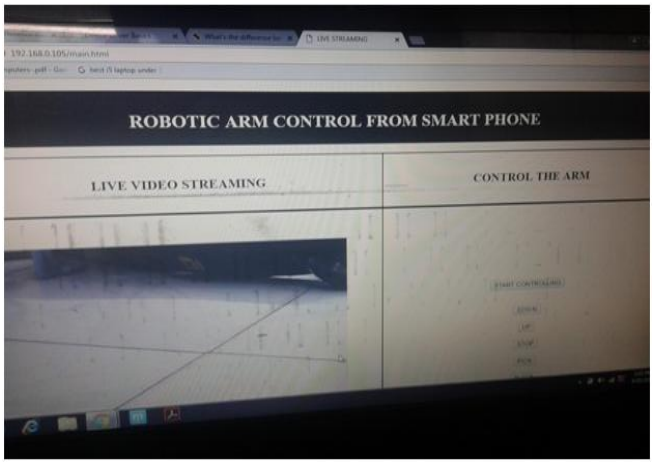

Figure-5: Output on web server

V. CONCLUSION:

The Raspberry Pi can be used for the control of a Robotic Arm with Smartphone from a remote area. The present scenario internet controlled robot has several disadvantages such as wired restrictions and server problems. In this smartphone technique the delay and server problems are reduced as the Wi-Fi is used which is the fastest usage of internet. In present situation most of the people uses the smartphone worldwide.The robotic arm can perform nearly same movements using the stepper and DC motors having a precise control. Smartphone

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