Wi-Fi Controlled Robotic Arm

Aishwarya Kulkarni, Minal Wagh, Poonam Kamble, Suruchi Walde and Sujata Bhele

Aishwarya Kulkarni (Electronics, Guru Nanak Institutes Of Engineering & Technology/RTM Nagpur University, Nagpur
Email: aishwarya05.kulkarni@gmail.com
Meenal Wagh (Electronics, Guru Nanak Institutes Of Engineering & Technology/RTM Nagpur University , Nagpur
Email: minalwagh15@gmail.com
Poonam Kamble (Electronics, Guru Nanak Institutes Of Engineering & Technology/RTM Nagpur University ,Nagpur
Email: poonamkamble345@gmail.com
Suruchi Walde (Electronics, Guru Nanak Institutes Of Engineering & Technology/RTM Nagpur University , Nagpur
Email:suruchiwalde@gmail.com
Sujata G.Bhele(Electronics, Guru Nanak Institutes Of Engineering & Technology/RTM Nagpur University , Nagpur
Email:sujata_bhele@yahoo.co.in

ABSTRACT

The main aim of this paper is to handle various activities which will directly reduces human efforts. Mankind has always strived to give life like qualities to its artefacts in an attempt to find substitutes for himself to carry out his orders and also to work in a hostile environment. The popular concept of mechanical arm is of a machine that looks and works like a human arm. This paper present the design of a controller intended for teleoperation. It is capable of controlling and anthropomorphic robotic arm through a Wi-Fi. The system uses several interdependent processing modules to provide numerous functionalities and make use of the already wide spread Wi-Fi technology as its wireless communication medium. The user can control the robotic arm remotely and access its sensory feedback signal as well. The camera may mount on the robotic arm which takes images and transmit to the control station. The system has been design with project portability in mind and consequently will required minimal modification for other applications. In this paper, the robot is designed to move by our command.

Index Term— Anthropomorphic, Control Station, Interdependent Modules, Mechanical Arm, Teleportation.

1. INTRODUCTION

This paper proposes a method for controlling a robotic arm using an application build in the android platform. The android phone and raspberry piboard is connected through Wi-Fi . As the name suggests the robotic arm is designed as it performs the same activity as human hand works. The android application is the command centre of the robotic arm. This paper presents the design of a controller intended for teleoperation. It is capable of controlling an anthropomorphic robotic arm through a LAN or via the internet. The system uses several interdependent processing modules to provide numerous functionalities and makes use of the already wide spread Wi-Fi technology. The robotic arm is controlled using a master slave control methodology. In this paper we present that the user can control the robotic arm remotely and access its sensory feedback signals as well. The WCCN has been designed with project portability in mind, and consequently will require minimal modification for other applications. We present an indoor positioning system developed for Android smartphones, coined Airplace. To infer the unknown user location we rely on ubiquitous WLANs and exploit Received Signal Strength (RSS) values from neighboring Access Points

(AP) that are constantly monitored by the mobile devices under normal operation. Our system follows a mobile-based network-assisted architecture to eliminate the communication overhead and respect user privacy. In a typical scenario, when a user walks inside a building a smart phone client conducts a single communication with our Distribution Server to receive the RSS radio map and is then able to position itself independently using the observed RSS values. This paper presents a robot system for handling various objects in home or office environments. A fixed manipulator utilizes marks on objects for handling and motion planning. The manipulator accesses the information using a camera in its hand. The robot can decide its complex handling motion based on the information.

2.   PROPOSED METHOD

The block diagram of the proposed system is shown in figure. It consist of an atmega8 controller IC , Wi-Fi module, 2 DC motors,5 servo motors and L298 IC. The robotic arm consists of a robotic arm placed on a moving vehicle. The vehicle is able to move along any type of surfaces. It uses two motors for this operation. The robot uses servo motor for the operation of the system i.e. movement of the arm. the arm consist of an arm assembly with a jaw, which is only able to move in up & down direction. Servo motor controlled by passing pulse width modulated signal. It is specialized for high response, high precision and positioning. For the controlling of motor driver IC (L298/) and atmega8 microcontroller. The input signal or controlling signal is given from laptop, which is interfaced with the microcontroller by a W-Fi module.
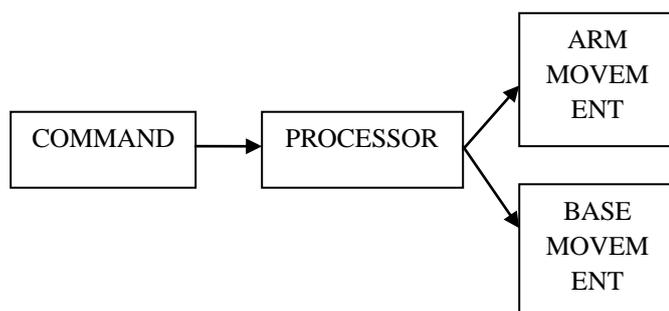
3.   BLOCK DIAGRAM

Fig 1: Block diagram of Wi-Fi controlled robotic arm

The block diagram of Wi-Fi controlled robotic arm is shown above. First the instruction is given to the command block. It consist of the Wi-Fi module and the input instruction device i.e. laptop. Suitable for adding Wi-Fi functionality to an existing micro controller via UART serial communication. It will follow 802.11b/g/n protocol. Integrated TCP/IP protocol stack. The command block will pass the instruction set to the processor block .Processor block mainly contains AT-MEGA 8 IC processor will process the given instruction set accordingly. Servo motors handle all the rotating arm movement It is self contained electric device that controls angular and linear movement of machine with great precision. It is specialized for high-response , high precision , positioning. The forward and the reverse movement of the base part is totally controlled by relay driver IC . It is an array of seven NPN Darlington transistors. It is known for high voltage. It permit the low power circuit to switch high current ON and AFF which should be electrically isolated from controlling circuit.

4.   EXPERIMENTAL RESULTS

ENA	IN1	IN2	DESCRIPTION
0	N/A	N/A	Motor a is OFF
1	0	0	Motor a is stopped
1	0	1	Motor a is ON & turning backward
1	1	0	Motor a is ON & turning forward
1	1	1	Motor is stopped

Table 1: Motor Operation

5.   CONCLUSION

Robots are being used worldwide to increase quality and meet production requirements. This will make drastic change in the field of electronics and networking and can be used for each and every kind of manual handwork. The maximum weight that can be carried by this model is depend on the capacity of the DC motor used. Very useful and interesting applications can be made by interfacing the pick and place robot with explosive detectors, metal detectors ,wireless camera, night vision camera for finding the bomb and proper visual assistance.

6. ACKNOWLEDGEMENT

7. REFRENCES

[1] KeerthiPremkumar: K Gerard Joe Nigel "Smart Phone Based Robotic Arm Control Using Raspberry Pi, Wi-Fi And Android Date: 19-20 March 2015 Publisher: IEEE

[2] GourabSenGupta ,S.C.Mukhopadhyay, Matthew Finnie

"WIFI based control of robotic arm".

[3]   S.Sen   Gupta,   R.Paddison,   C.H.Messom, S.Demidenko.]"Wireless Master-Slave Embedded Controller for a Teleoperated Anthropomorphic Robotic Arm" Date: 23-29 April, 2006. Publisher: IEEE

[4] The Airplace Indoor Positioning Platform for Android Smartphones   Christos Laoudias; George Constantinou; Marios Constantinides; Silouanos Nicolaou; Demetrios Zeinalipour-Yazti; Christos G. Panayiotou Date: 5-7 May, 2009. Publisher: IEEE

[5] Android based smart home system with control via Bluetooth and internet connectivity. Shiu Kumar; Seong Ro Lee

[6] Real-time hand gesture telerobotic system using fuzzy c-means clustering J. Wachs; U. Kartoun; H. Stern; Y. Edan

[7] Handling of objects with marks by a robot R. Katsuki; J. Ota; Y. Tamura; T. Mizuta; T. Kito; T. Arai; T. Ueyama; T. Nishiyama

[8] Tan, Ming Chun (2005). Autonomous Robot Navigation using Radio Frequency.   Bachelor Project. Thesis. Universiti Teknologi Malaysia, Skudai.

[9] R. C. Luo, K.L. Su, .A multi agent multi sensor based real-time sensory control system for intelligent security robot. IEEE International Conference on Robotics and Automation, vol. 2, 2003, pp.2394 .2399.