

WiFi Robocar with Network Camera

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Abstract— This paper presents a designing process and implementation details of WiFi Robocar using IEEE 802.11g standard. It has also a live-feed network camera so that it can be driven without line of sight. Robocar which is received a command from laptop linked through the use of a wireless router and a Dynamic Host Configuration Protocol (DHCP) program. The study of performances on the automatic wireless Robocar is tested as, networks of wirelessly interconnected devices that are able to ubiquitously retrieve multimedia content such as video and audio streams, still images, and scalar sensor data from the environment. In this paper, the state of the art in algorithms, protocols, and hardware for wireless multimedia sensor networks is surveyed, and open research issues are discussed in detail along with their advantages and drawbacks. Currently off-the-shelf hardware as well as available research prototypes for WMSNs are listed and classified. Existing solutions and open research issues at the application, transport, network, link, and physical layers of the communication protocol stack are investigated, along with possible cross-layer synergies and optimizations.

Keywords—Wireless IEEE Standards, WiFi communication, Robotics, WMSNs

I. INTRODUCTION

Nowadays, applications of telerobotics can benefit from Wireless Local Area Network (WLAN) technology. The development of teleoperated systems has gained considerable attention in recent years due to the new potential applications, such as remote production monitoring, remote exploration and manipulation in inhospitable environments, telesurgery, and remote training etc Important issues concerning communication channels, random propagation delays, bandwidth limitations, fault-tolerance, synchronization, telepresence, and the stability of the robotic systems involving human operators have all been taken into account in different works across the literature. Most of them consider Internet as the interconnection network between telecontrolled systems and control stations.

IEEE 802.11 Wireless standards can be utilized for many applications depending on characteristics of duties. In this way, there are three wireless standards of IEEE 802.11 (IEEE 802.11a/b and IEEE 802.11g) which are typically popular in existing days. Each type of wireless standards can summarize advantages and disadvantages as follows. For the IEEE 802.11a standard, the operating frequency and the maximum speed of transferred data are at 5 GHz and 54 Mbps, respectively, however: the working radius is a short length and cost is high expensive, therefore it is less popular. The IEEE 802.11b standard employs the operating frequency at 2.4 GHz and it has the maximum speed of transferred data at 11Mbps. The operating frequency and the maximum speed of transferred data are at 2.4 GHz and 54 Mbps, respectively. as well as the working radius is also higher than that of two previous standards. performances on a wireless robot has been presented based on various brands of IEEE 802.11g standard and controlled by laptop however: it is unable to control by automation and the delay time of transmitting images is a relatively high approximately at 0.5 ms due to the use of web server. In the well open literature, no other researchers have been reported for a study of performances on an automatic wireless robot using IEEE 802.11g standard and infrared sensors.

In this paper, a study of performances on an automatic wireless robot is presented through the use of IEEE 802.11g standard. The Robocar controlling equipments (e.g. motors) through a PIC microcontroller and also Robocar which is received a command from laptop linked through the use of a wireless router and a Dynamic Host Configuration Protocol (DHCP) program. The study of performance on the automatic wireless Robocar is tested as, networks of wirelessly interconnected devices that are able to ubiquitously retrieve multimedia content such as video and audio streams, still images, and scalar sensor data from the environment. The connection between Linksys WRT54GL router and wifi enabled laptop we have to use the Dynamic Host Configuration Protocol(DHCP). When a DHCP-configured client (a computer or any other network-aware device) connects to a network, the DHCP client sends a broadcast query requesting necessary information from a DHCP server. The DHCP server manages a pool of IP addresses and information about client configuration parameters such as default gateway, domain name, the DNS servers, other servers such as time servers, and so forth. On receiving a valid request, the server assigns the computer an IP address, a lease (length of time the allocation is valid), and other IP configuration parameters, such as the subnet mask and the default gateway. The query is typically initiated immediately after booting, and must complete before the client can initiate IP-based communication with other hosts. Depending on implementation, the DHCP server may have three methods of allocating IP-addresses viz, dynamic allocation, automatic allocation, Static allocation.

II. ANALYSIS AND DESIGN

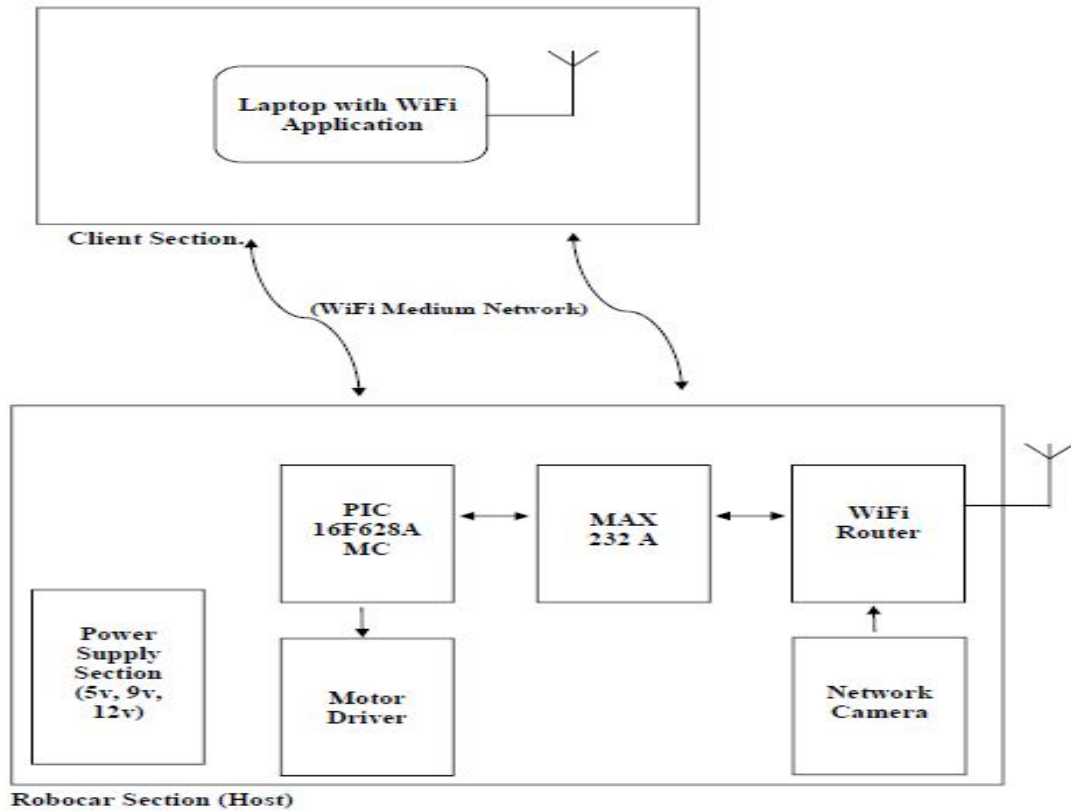


Fig. 1 Basic Schematic Block Diagram

4. Flowchart Structure

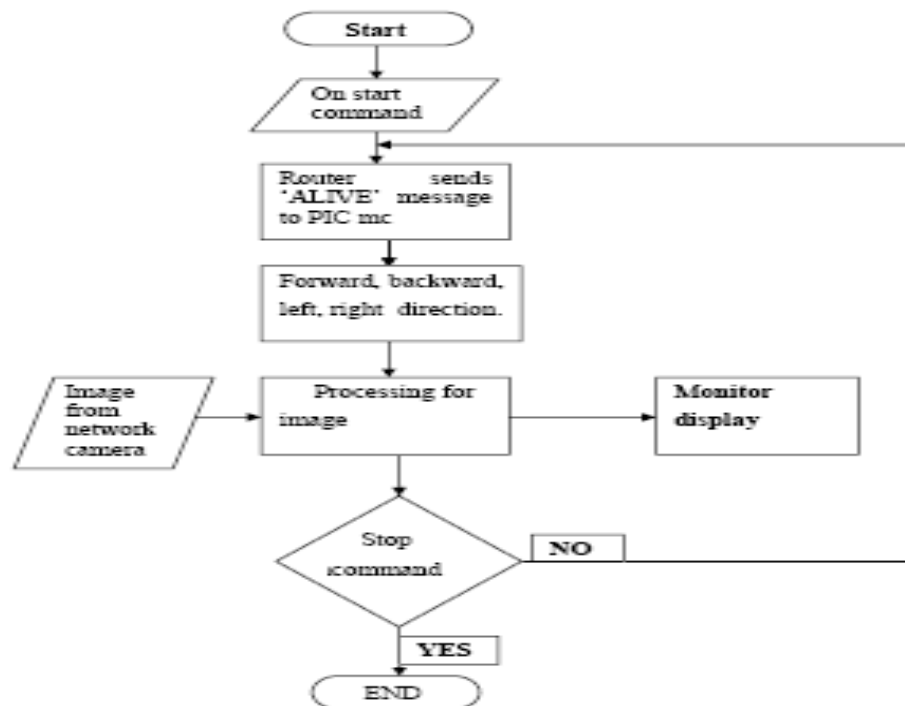


Fig 2. Software Structure of Controlling WiFi Robocar.

An LED on the back of the Robocar glows red while the router is booting up by using Dynamic Host Configuration Protocol (DHCP). When the router sends an 'alive' message to the microcontroller, the LED turns green and then connects with the VB client application which will present on the laptop. After words we will give the commands i.e. forward, backward, left, and right and stop.

This performance of Robocar will focus topics as follows:-

- Strength of the transmitted signals on the air is measured in terms of distances depending on the received data (no loss).
- Delay time of transmitting and receiving images is considered from the robot to display on the laptop.

III. EXPERIMENTAL RESULTS

- The camera will records at 30frames per seconds (fps), so somehow there will be +/- 3.3% error from the camera.
- The car could travel 3m in 0.7 seconds (21 out of 30 frames in 1 second).
- Our aim to achieve Top Speed: 4.3m/s = 15.5km/h = 9.6miles/h.
- Data Rates:-
 - Control Signals: 3.5KB/s.
 - Camera: 50-190KB/s.
- If the car was to be driven from very far away, the router would continually negotiate a lower speed until it reached 1Mb (megabit). At this speed, the camera wouldn't be able to send back data.

A rate of transferred images	Frame/second (fps)	30
Delay time for transmitting and receiving images considered at a rate of transferring images	millisecond (ms)	50
Maximum distances	meter (m)	350

IV. CONCLUSION

A designing process and implementation details and also The study of performances of “WiFi Robocar with network camera” were described. The Robocar is wirelessly remote controlled via WiFi network. In addition, analysis of the different kinds of working of WiFi Robocar was provided. Moreover, a review of the wireless Robocar remote controlling systems was provided. Networks of wirelessly interconnected devices that are able to ubiquitously retrieve multimedia content such as video and audio streams, still images, and scalar sensor data from the environment.

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