NETBOT WATCHER

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Special dedication to my loving mom and father, Puan Che Liah Bte.Othman and Encik Che Aman Bin Nordin, all my siblings and my dearest friends.

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ABSTRACT

The purpose of this project is to design and build a system that can control a Robotic System through wireless network from personal computer as base platform. The mobile robot will be used as a real robot and the wireless local area network (WLAN) will be use to navigate the mobile robot movement such as forward, reverse, left, right, stop, automation movement with ultrasonic sensors, and animated head up and down movement. The other objective of this project is to provide an add-on features so that any enhancement could be added in Local Area Network to extend the application of controlled robotic system by wireless networking. This project is a combination of hardware and software. A D-Link DSL-G604T ADSL router has been used to make a connection between mobile robot and computer. In this system, there are seven line data will be sent to define the mobile robot movement based on the user command and also used it to send a video capture. This system comes with interesting and user-friendly software that was developed by using Visual Basic. These robotic systems also include a D-Link DCS-950G internet camera to monitor the environment. It also has a guideline or help to conduct user on how to utilize the software correctly.

ABSTRAK

Projek ini bertujuan untuk merekabentuk dan membina sebuah sistem yang dapat mengawal sebuah sistem robotik melalui rangkaian tanpa wayar daripada komputer peribadi sebagai tapak pelantar. Robot ini akan digunakan sebagai robot sebenar dan rangkaian kawasan tempatan tanpa wayar (WLAN) akan digunakan sebagai medium untuk mengemudikan pergerakkan robot seperti hadapan, belakang, kiri, kanan, berhenti, pergerakkan automasi dengan pengesan ultrasonik, dan animasi pergerakan kepala keatas dan kebawah. Objektif projek ini antara lainnya adalah menyediakan satu ciri-ciri yang boleh ditambah didalam sistem rangkaian kawasan tempatan (LAN) tanpa wayar untuk memperluaskan aplikasi penggunaan robot ini. Projek ini adalah satu kombinasi perkakasan serta perisian. Model D-Link DSL G604T iaitu penghala ADSL telah digunakan untuk membuat satu sambungan di antara robot dan komputer. Terdapat tujuh data talian akan dihantar untuk mentakrifkan pergerakan robot berdasarkan arahan pengguna. Sistem ini datang dengan pakej menarik dan perisian mesra pengguna dengan menggunakan Visual Basic. Sistem robot ini juga menggunakan D-Link DCS 950G kamera internet untuk memantau persekitaran. Ia juga mempunyai satu garis panduan atau bantuan pengguna bagaimana untuk menggunakan perisian dengan betul.

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CHAPTER I

INTRODUCTION

1.1 BACKGROUND

Detachment education is one of the advantages these days. Many universities and schools are looking for including for including this kind of education in their programs. The technology has rapidly advanced to become more efficient and useful. One of the prevalent impacts in this technology is a wireless LAN or WLAN. The networking system will be valuable since it is not used a cable. A wireless LAN or WLAN is a wireless local area network, which is the linking of two or more computers without using wires. WLAN utilizes spread-spectrum technology based on radio waves to enable communication between devices in a limited area, also known as the basic service set. This gives users the mobility to move around within a broad coverage area and still be connected to the network. For the home user, wireless has become popular due to ease of installation, and location freedom with the gaining popularity of laptops. For the business, public businesses such as coffee shops or malls have begun to offer wireless access to their customers; some are even provided as a free service.

Why is network Robot Watcher (*NetBot Watcher*) recognition useful in virtual environments? Network Robot Watcher is exciting technology that promises to change the way we interact with computers in the future. They can use wireless LAN as an effective medium to perform the extra task and presumably increase the feeling of immersion in the virtual reality experience.

This project used an Ethernet basic system to control the system. It is a large and diverse family of frame-based computer networking technologies that operates at many speeds for local area networks (LANs). The first robot model is to implement the microcontroller web server to recognize the Ethernet using the Visual Basic 6.0. This project will utilize the ATMEL Microcontroller as a web server to process the output from the personal computer. The command will be received through a wireless router that connected to the robot which wills analyzer the command, convert it to its respective code and route it to the microcontroller. The ATMEL microcontroller will process the output from the wireless router to move the robot system.

In this final project, the robot model will be the Mobile Robot. To build a mobile robot is actually not difficult, as most of the parts and designing are quite standard. It will be the wireless network system of the mobile robot that takes up a lot of times and works to develop.

The mobile robot will respond accordingly to the command that user give. User will give command to the robot via wireless adapter that connected to the computer. The computer will process it and output the result to the wireless adapter that connected using the USB port. The wireless adapter than will send the signal to the wireless router using the Radio frequency signal. The mobile robot used ATMEL Microcontroller as its brain to execute the output from the wireless router.

1.2 PROBLEM STATEMENTS

In a place that having a wireless network connection through LAN, the application focused on sharing file and surf the internet. The wireless LAN technology actually extended to common application. For example, mostly wireless network system used only is being housed, at the office and in hotspot as an internet access point. Not many systems involve in wireless LAN technology that can control the electronic device or robotic system. New problems require new solutions. Monitor effectiveness without the expense or risk of mesh networks. Check on buildings and inspect trouble sites remotely to reduce emergency site visits.

In this project, we will solve the state problem listed below:

- *Monitoring*

  Remote monitoring enables you to see from long distances without have to walk up something the object. From any location with a wireless network connection, you can control and see exactly from 50 meter radius.

- *Patrolling*

  Netbot Watcher has also application patrol by using automation and manual control. It will do routine patrol as good only accept directive from the user and will patrol by on the random each area. *Netbot Watcher* furnished ultrasonic sensor to avoid current obstacle automation patrolling.

- *Security*

  Efficient and safe operation is more important today. Operation in the hazardous zone is no longer need human to approach it. This is because every task that will be taken over by *Netbot Watcher* as observer early and indirectly reduces any accident.

1.3 PROJECT OBJECTIVE

This project is consisted of five parts. In the part I, the objective of this work is to control the robot movement with motor driver and used a wired remote. We use relay to move the main motor and used the L293D chip to move servo motor for animation head movement. In part II, the primary technical objective of the proposed project is to develop an automation system using ultrasonic movement detector. To this part explained that robot have sensor system capable changing robot direction if have been setbacks in front. For part III, the objective is to design the robot system using microcontroller module as a web server. This part is a main robot system because the system will process all data those sent. In the part IV, the objective of this work is to develop a software using Microsoft Visual Basic 6.0 to control the robot system. This is a programming tool in order to develop software to control the mobile robot system and the video camera as a movement monitor. Part V is to familiarize with the wireless LAN operation and the number of data input and output. In this part, we use wireless router as intermediary between robot system and personal computer.

CHAPTER II

LITERATURE REVIEW

2.1 NETWORKING

2.1.1 Historical Background

Wireless networks have significantly impacted the world as far back as World War II. Since then wireless networks have continued to develop and its uses have significantly grown. Cellular phones are part of huge wireless network systems. Sending information over seas is only possible through wireless network systems using satellites and other signals to communicate across the world otherwise getting information Emergency services such as the police department utilize wireless networks to communicate important information quickly. People and businesses use wireless networks to send and share data quickly whether it be in a small office building or across the world. Wireless networks allow you to eliminate messy cables. Sometimes nearby networks are using the same frequencies; this can also cause interference within the network and can reduce its performance.

Compatibility issues also arise when dealing with wireless networks. Wireless networks, in terms of internet connections, are typically slower than those that are directly connected through an Ethernet cable. A wireless network is more vulnerable because anyone can try to break into a network broadcasting a signal. Many networks offer WEP - Wired Equivalent Privacy - security systems which have been found to be vulnerable to intrusion. WPA provides more security to wireless networks than a WEP security set up. The use of firewalls will help with security breaches which can help to fix security problems in some wireless networks that are more vulnerable.

In 1971, researchers at the University of Hawaii developed the world's first WLAN, or wireless local area network, named ALOHAnet. The bi-directional star topology of the system included seven computers deployed over four islands to communicate with the central computer on the Oahu Island without using phone lines.

Originally WLAN hardware was so expensive that it was only used as an alternative to cabled LAN in places where cabling was difficult or impossible. Early development included industry-specific solutions and proprietary protocols, but at the end of the 1990s these were replaced by standards, primarily the various versions of IEEE 802.11 (WiFi). An alternative ATM-like 5 GHz standardized technology, HIPERLAN, has so far not succeeded in the market, and with the release of the faster 54 Mbit/s 802.11a (5 GHz) and 802.11g (2.4 GHz) standards, almost certainly never will.

In November 2006, the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) won a legal battle in the US federal court of Texas against Buffalo Technology which found the US manufacturer had failed to pay royalties on a US WLAN patent CSIRO had filed in 1996. CSIRO are currently engaged in legal cases with computer companies including Microsoft, Intel, Dell, Hewlett-Packard and Netgear which argue that the patent is invalid and should negate any royalties paid to CSIRO for WLAN-based products.

2.1.2 Wireless distribution system

A Wireless Distribution System is a system that enables the interconnection of access points wirelessly. As described in IEEE 802.11, it allows a wireless network to be expanded using multiple access points without the need for a wired backbone to link them, as is traditionally required.

An access point can be either a main, relay or remote base station. A main base station is typically connected to the wired Ethernet. A relay base station relays data between remote base stations, wireless clients or other relay stations to either a main or another relay main station. A remote base station accepts connections from wireless clients and passes them to relay or main stations. Connections between "clients" are made using MAC addresses rather than by specifying IP assignments.

All base stations in a Wireless Distribution System must be configured to use the same radio channel, and share WEP keys if they are used. They can be configured to different service set identifiers.

WDS may also be referred to as repeater mode because it appears to bridge and accept wireless clients at the same time (unlike traditional bridging). It should be noted; however, that throughput in this method is inversely proportional to the number of "hops", as all traffic uses the same channel. For example, client traffic going through one relay station before it reaches the main access point will see at most half the maximum throughput that a directly connected client would experience.

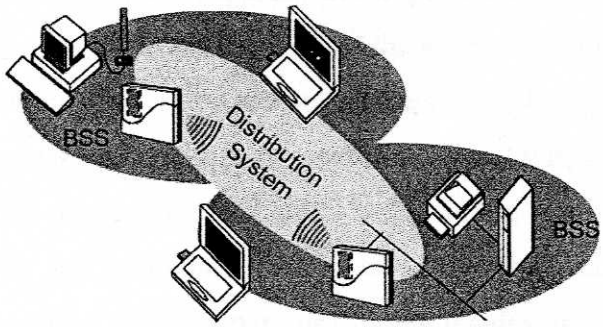

Figure 2.1: Wireless distribution system

2.2 ROBOT DEVELOPMENT RESEARCH

During design Netbot Watcher, we have study a several robots that have been developed previously as a guide. This research are involve system application, previous problems and after robot development and smart additional features. Sputnik had been chosen as a current guide to build netbot watcher. This is because it is controlled via wi-fi and has a lot of smart additional features. It also in the framework to upgrading the robot which is ready existing in Universiti Teknikal Malaysia Melaka. Among robot select is voice controlled robot.

2.2.1 Sputnik Robot

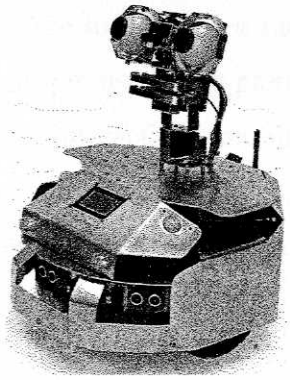

Figure 2.2: Sputnik Robot

The technology underlying Dr Robot's WiFi robots evolved from its Distributed Computation Robotic Architecture, originally developed for Dr Robot's Humanoid (HR) Robot. Using this approach, high-level control of the robot is maintained by a remote or local PC/server communicating by a secure wireless link. Low-level functionality is managed primarily by two onboard digital signal processor (DSP) while computationally intensive operations are performed off board. The result is a robot that's lighter, draws less power, runs longer and is dramatically less expensive than a fully bundled or self-contained system. Moreover, since primary processing resides in a server, any hardware upgrades to the central unit are shared by all the robots it controls.