

SCOUT ROBOT FOR SURVEILLANCE

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Abstract—Robots are used in almost every application as of today's world. The project is based on a robot used for surveillance. As there are many human casualties in for example war zones or any compromised situations where it is too risky to send a human which may endanger his life as well as the hostage. The robot comes in use in such times as we can operate it from a safer Distance from a base station. The robot transmits the live feed of information through a RF module. A night vision camera is used to encounter under low lights also. There are more add on applications for this project such as a bomb detector, signal jammer, metal detector etc.

Keywords—wireless, robot, RF module, night vision camera

I. Introduction

Robotics is a staple of advanced manufacturing for over half a century. Robotics is one of the hot fields in modern age in which the nations are concentrating upon the military purpose in the state of war and peace. Robot is a machine that is controlled, in whole or in part, by an onboard computer. Robots also have sensors that allow them to get information from their surroundings, some form of locomotion and a power source. As robots and their peripheral equipment become more sophisticated, reliable and miniaturized, these systems are increasingly being utilized for military and law enforcement purposes.

Today's modern military forces are using different kinds of Robot for different application. Mobile robotics plays an increasingly important role in military matters, from patrol to dealing with potential explosives. With suitable sensors and cameras to perform different missions, mobile robots are operated remotely for reconnaissance patrol and relay back

video images to an operator for surveillance. Latest techniques are being investigated to have advance and intelligent Robot for different operations.

Robotics helps to meet challenges posed by the specter of urban terrorism. Instead of having people get close to hazards such as unattended objects or car bombs, robots are used. If an operator concludes a dangerous object might explode, the robot could neutralize that object by shooting to detonate it.

The military robots also have different shapes according to the purposes of needs. Robots designed to help soldiers on the battlefield have to be carried onto the battlefield by those soldiers. For that reason, Robot builders try to design "man-portable" designs. A man-portable robot can be carried by a single soldier, usually in a special backpack.

In our project we propose a military surveillance robot, which is controlled by PC. It has additional features to detect human, Darkness and metal. It also has a wireless camera to capture the visuals.

II. Literature Survey

The history of robots has its origins in the ancient world. The modern concept began to be developed with the onset of the Industrial Revolution which allowed for the use of complex mechanics and the subsequent introduction of electricity. This made it possible to power machines with small compact motors. The first uses of modern robots were in factories as industrial robots – simple fixed machines capable of manufacturing tasks which allowed production without the need for human assistance.

During the time of World War II and the Cold War, these robots were in the form of German Goliath tracked and Soviet teletanks. It is also believed that military robots history can be dated back to the 19th century, precisely in 1898. The history begins with the invention of radio controlled boat intended for military use by Nicola Tesla. He offered his invention to US navy in order to produce radio controlled torpedoes but the navy refused his offer. Later, he offered his invention to the United Kingdom.

The next important step that gives a turning point in the history of military robots was in 1930-ties in the Soviet Union. Soviet Union made a remote controlled tank called as 'teletank'. Later on the tank's control system was modified and to control the tank electric relays and radio signals were used. Depending on weather and other conditions teletank could be controlled from 500-1500m away. The teletanks were equipped with DT machine guns, flamethrowers and smoke container to provide a smokescreen.

The used of Goliath which is a mobile landmine in World War II by the Third Reich's forces also marked a turning point in the history of military robots. Goliath was roughly 1.50 m long, 0.85m wide and 0.6 m high. The first version of Goliath was Sd.Kfz. 302 (Goliath E). This Goliath version has two batteries driven 2.5 KW electro motors. However, the second version of goliath i.e. Sd.Kfz.303 or "Goliath V" was equipped with a gasoline engine since it could provide greater range and was cheaper. This is the history behind military robots.

2.1 SYSTEM STUDY

System study involves the following two processes

1. Study and analysis of existing system.
2. Modify and redefine the procedures to achieve precise and logical patterns.

The first stage deals with the existing system and the limitations inherent in it. In the second stage, the users are queried for their additional requirements to be incorporated in the proposed system. The features of the proposed system are outlined in comparison with the existing system.

Internal design involves conceiving, planning out and specifying internal structures and processing details of the software product. The goals of the internal design are to specify internal structures and processing detail to record design decisions and indicate why certain alternatives and trade off were chosen, to elaborate the test plan and to provide blueprint for implementation, testing and maintenance.

External design of software involves conceiving, planning out and specifying external observable characteristics of software product. These characteristics include user displays, report format, functional requirements high level process structures for the product. External design begins during the analysis phase and continues in the design phase.

2.2 EXISTING SYSTEM

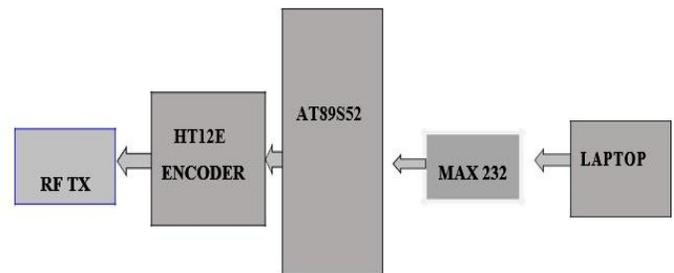
The existing method to detect explosives by rescue community is using search dogs where the trained dogs are used to identify the explosives. Search and rescue dogs are typically worked by a small team on foot. Probes mounted with camera are used to capture the visuals, or by risking the life of the bomb squads rescue operations are undertaken. All these techniques are not efficient, time consuming and risky.

2.3 PROPOSED SYSTEM

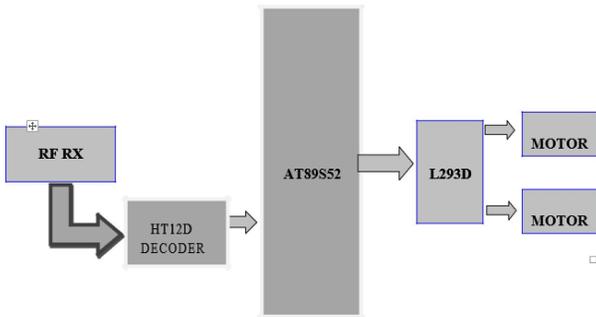
The existing system can be made more efficient by using a robot to assist the rescue community. The robot is entirely controlled by a personal computer. It has a wireless camera mounted, which gives the visual information. So it can be remotely controlled. It can detect metals which in turn detects bombs. Since the robot is remotely controlled, on the pc console the message corresponding to the detection is displayed.

BLOCK DIAGRAM

TRANSMITTER:



RECEIVER:



At the Transmitter data is transmitted to Atmel through Max232 IC which acts as an interface between Atmel and PC. This data is wirelessly transmitted via RF transmitter module. Encoder is used for serial transmission of data from PC.

At the Receiver the serial data received by RF receiver module, which is decoded and passed onto the microprocessor which controls the motion of the motors through motor driver IC.

III. Components used

A. MICROCONTROLLER AT89S52

The brain of this project is the Microcontroller that controls the robot via PC. The Microcontroller has 4 ports..Port 1 is the input from RF receiver Port 2 is used to control the wheels of the robot through motor driver IC (L293D). Port 3 is used for glowing power LED and to receive the metal detection output .

B. METAL DETECTION

The robot is equipped with a proximity sensor to detect the metal. On detection of metal, the message “Metal is detected” is displayed on the monitor of the personal computer. This message is sent by the microcontroller to the personal computer using Zigbee.

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In our project we are using Proximity Sensor LM12 – 3004PA. It is an inductive proximity sensor used to detect metals. Its testing distance is 4mm and output state is normally open (NO). That is if a metallic part gets close enough to the coil, the current will increase and the proximity switch will open. The output voltage drop is less than 3V.

C. WIRELESS CAMERA AND RECEIVER

Wireless camera is used to capture the visuals and wirelessly transmit the signals to the receiver. The camera receiver of 2.4 GHz is used. The camera receiver receives the signal and gives to the TV tuner connected to the computer to view the visuals. It has IR led’s to aid night vision

D. TV tuner (USB 2.0 TV stick)

We use the TV tuner to watch the visuals captured by the wireless camera on the computer. The TV tuner is connected to the camera receiver which receives the signal from wireless camera. Before you add TV tuners to your computer you may need to install a driver for each TV tuner that you connect to your computer.

IV. SOFTWARE REQUIREMENTS

Embedded C is the most popular embedded software language in the world. Most embedded software is written in Embedded C. Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. Embedded C has several keywords that are not present in C.

Thecode for the Microcontroller is written in embedded C.

“Burning a program” into a controller includes

1. Writing the program in C language in a text editor like notepad.
2. Compiling the program in a compiler and
3. Generating the hex code from the compiled program.

The Keil software is an integrated development environment (IDE), which integrated a text editor to write programs, a compiler and it will convert your source code to hex files too.

In our project we are using SP200S programmer. A programmer is a device that configures programmable non-volatile digital circuits. This programmer uses WLPRO software. The Willar software through which the HEX file created by KEIL is loaded & burned on to the target chip ATMEL microcontroller using the SP200S programmer.

HyperTerminal (also known as HyperTerm) is a communications and terminal emulation program that comes with the Windows operating system, beginning with Windows 98. HyperTerminal can be used to set up a dial-up connection to another

computer through the internal modem using Telnet or to access a bulletin board service (BBS) in another computer.

V. APPLICATIONS

The product will have higher fidelity and will be versatile. Different fields can use the product for the various applications. From geological exploration to the security system this product will have the capability to fulfill the required purpose. In general, the use and application can be summarized as:

- ❖ Home security system
- ❖ Use in the military fields for the information collection
- ❖ Geographical exploration
- ❖ Path tracker and exploration beyond human resources
- ❖ Security system
- ❖ Other remote control systems
- ❖ Domestic Services (cleaning etc.)
- ❖ Entertainment (robotic toys etc.)
- ❖ Scientific Instrumentation

VI. CONCLUSION AND FUTURE WORK

This project presents a Laptop Controlled Vehicle using RF communication with wireless data transmission and it is designed and implemented with Atmel AT89S52 MCU in embedded system domain.

The robot is moved in particular direction using Serial Data Communication. Experimental work has been carried out carefully. The result shows that higher efficiency is indeed achieved using the embedded system. The proposed method is verified to be highly beneficial for the security purpose and industrial purpose.

On the other hand, however, the tests also clearly indicated areas where improvement, modification, specification change and additional features to the robot are required to serve better for the intended purpose. However, the idea always has a lot of rooms to make enhancements in the future and the defects can be corrected to make the idea to be utilized in real practice. These issues became identified as a result of our engineers conducting both the domestic tests and the overseas tests by themselves, and in this respect the findings were all the more practical.

The practical application domains where robotic technology is most likely to be used are:

REFERENCES

- [1]"ATMEL 8-BIT MICROCONTROLLER WITH 4/8/16/32KBYTES IN-SYSTEM PROGRAMMABLE FLASH", <http://www.atmel.com/>, 2016. [Online]. Available: http://www.atmel.com/images/atmel-8271-8-bit-avr-microcontroller-atmega48a-48pa-88a-88pa-168a-168pa-328-328p_datasheet_complete.pdf. [Accessed: 25- Apr- 2016].
- [2]R. Team, "How to make a PC controlled Wireless Robot :Robokits India, Easy to use, Versatile Robotics & DIY kits", *Robokits.co.in*, 2016. [Online]. Available: <http://robokits.co.in/how-to-make-a-pc-controlled-wireless-robot>. [Accessed: 14- Apr- 2016].
- [3]B. SHANKHALPARA, "BHARGAV SHANKHALPARA'S SITE", *Allaboutelectronics.hpage.in*, 2016. [Online]. Available: <http://www.allaboutelectronics.hpage.in>. [Accessed: 06- Apr- 2016].
- [4]"Wireless PC Controlled Robot Using Bluetooth: Project with Circuit Diagram", *Engineersgarage.com*, 2013. [Online]. Available: <http://www.engineersgarage.com/contribution/experts/wireless-pc-controlled-robot-using-bluetooth>. [Accessed: 27- Apr- 2016].
- [5]"L293x Quadruple Half-H Drivers", <http://www.ti.com>, 2016. [Online]. Available: <http://www.ti.com/lit/ds/symlink/l293.pdf>. [Accessed: 13- Mar- 2016].
- [6]"RF Module (Transmitter & Receiver)", <http://www.engineersgarage.com/>, 2016. [Online]. Available: <http://1.www.engineersgarage.com/electronic-components/rf-module-transmitter-receiver>. [Accessed: 16- Mar- 2016].
- [7]"Arduino/Atmel + CC85XX driver/library/code? - PurePath Wireless Read-Only Forum - PurePath Wireless - TI E2E Community", *E2e.ti.com*, 2016. [Online]. Available: http://e2e.ti.com/support/wireless_connectivity/purepath_wireless/f/382/t/412572. [Accessed: 15- May- 2016].
- [8]"BLE porting issue on atmel sama5d31. - WiLink? WiFi + Bluetooth Forum - WiLink? WiFi + Bluetooth - TI E2E Community", *E2e.ti.com*, 2016. [Online]. Available: http://e2e.ti.com/support/wireless_connectivity/wilink_wifi_bluetooth/f/307/p/490633/1780126?keyMatch=atmel&tisearch=Search-EN. [Accessed: 15- May- 2016].
- [9]"wireless data transfer - MSP Low-Power Microcontroller Forum - MSP Low-Power Microcontrollers - TI E2E Community", *E2e.ti.com*, 2016. [Online]. Available: <http://e2e.ti.com/support/microcontrollers/msp430/f/166/p/178894/644215#644215>. [Accessed: 15- May- 2016].
- [10]"wireless digital video camera - WiLink? WiFi + Bluetooth Forum - WiLink? WiFi + Bluetooth - TI E2E Community", *E2e.ti.com*, 2016. [Online]. Available: http://e2e.ti.com/support/wireless_connectivity/wilink_wifi_bluetooth/f/307/t/387603. [Accessed: 15- May- 2016].