Design of Automated Machine Gun using Wireless and Embedded Technology for Defensive Purpose

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ABSTRACT: *This paper presents design of automated machine gun using wireless and embedded technology for defensive purpose which takes the decision on it's own and operate itself as per requirement or as per defined by the user. Proposed system is a combination of the robotic controlled tank and remote operated machine gun. It uses the design of TRAP system. Features that we have added in this system are 360 degree rotation of base and machine gun, laser beam, emergency torch, motion detection using sensors, Camera Based Motion Identification, LDR based Light detection, Temperature Detection (Thermostat), Controlling using voice command, Wireless Connectivity. The wireless and embedded technology is used for the design and development of this approach. This system can be very useful in ground level combat save most worthy human life.*

Keywords: Robotic controlled tank, TRAP, Automatic gun technology, Motion sensors, LDR light detection

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1. Introduction

This paper describes the system which offers the world's most complete line of remote armed delay/denial and unarmed reconnaissance platforms. The proposed system is a combination of automated machine gun and transportable vehicle (robotic controlled tank). It uses the design of TRAP system. The TRAP (Telepresent Rapid Aiming Platform) is a remotely operated weapons system. It is designed to keep soldiers out of the line of fire.

Major limitation with only remote operated machine gun is non portability so by providing transportation capability system is more powerful and it gives more controlling and operational flexibility to the user. Features that we have added in this system are 360 degree rotation of base and machine gun, laser beam to point the target, emergency torch to give the light in dark places, motion detection using sensors, Camera Based Motion Identification to capture video frames using web camera and then by employing image pattern matching (processing) methodology try to get the motions in current frames, LDR based Light detection to get the presence of natural or artificial light, Temperature Detection (Thermostat) to get the environmental temperature level , controlling the system using voice command, Wireless Connectivity between transmitter and receiver and System Software which is operated by user and which provides full system monitoring and controlling functionality.

System is controlled using wireless signal. So we have built a remote signal transfer platform. This remote signal transfer

platform is used to sense different environmental changes using sensors and wireless network. The wireless and embedded technology is used for the design and development of this approach. This system can be very useful in ground level combat save most worthy human life.

So this paper presents the design and implementation of wireless auto mated defensive machine gun which takes the decision on it's own and operate itself as per requirement or as per defined by the user.

2. Literature survey for existing method

The TRAP (Telepresent Rapid Aiming Platform) is a remotely operated weapons system. It is designed to keep soldiers out of the line of fire. The equipment can be placed in the line of fire while the operator stays in a safe. TRAP systems deliver maximum accuracy with complete operator security. They enable a new level of Anti-Terrorist/Force Protection (AT/FP) to counter today's threats. TRAP systems are lightweight and easy to operate. They can be used both for mobile operations and for the security of fixed assets such as military installations, nuclear power plants and pipelines. All armed TRAP systems provide a decisive overmatch against a conventional ground-based threat. The key benefits of the combat-proven TRAP are significantly increased safety and greatly improved effectiveness. TRAP operators remain outside the line of fire, conduct threat assessments under less stress with greater situational awareness, and, if needed, deliver force with surgical accuracy. The major limitation with the current system is that the TRAP system is portable but not autonomous transportable it needs any system or human interaction which can transport the system. On other hand robotic wireless transportation system in defense are not ready to defense or protect itself by cross attack or firing. Much defense organization having tanker which can perform both tasks but still they are manual operated human interaction is most important role in these tanks.

3. Problem definition

Proposed system is a combination of the robotic controlled tank and remote operated machine gun. Major limitation with remote operated machine gun is non portability so by providing transportation capability system is more powerful and it gives more controlling and operational flexibility to the user. This system can be very useful in ground level combat save most worthy human life.

4. Proposed work

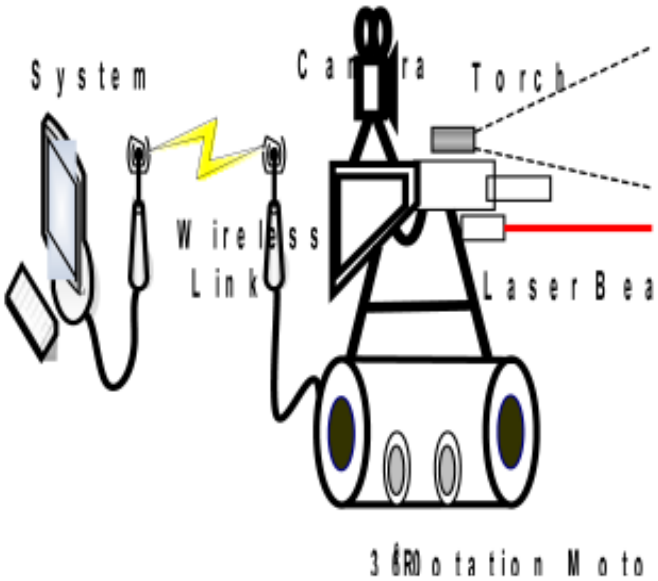

Figure 1. Proposed system structural diagram

Above diagrams show the basic block diagram of the proposed system. First part is input. Here user can give input using

keyboard or the program queue. This program is detected by the system and as per input send the signal to the remote controller that is connected to the system. Now remote controller will send some signals to the portable machine gun and it will control the mechanism or it will perform the actions. It contains the following parts.

4.1. Base vehicle (tank)

This is design to move or transport the whole system from one place to another location. It has two individual motors system on both side that is on left and right. It creates the tank like structure due to which vehicle can run in forward and backward direction and it can also turn at 3600 that we can see in figure 2. We have added two separate motors on the both side of the base vehicle. Now if one motor is running forward and another is running backward then vehicle turn or rotate in circular position. This is what we called 360 degree rotation which reduces vehicle turning radius which is most important parameter in any vehicle.

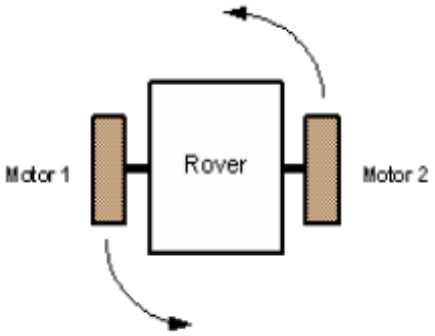

Figure 2. 3600 Rotation of base vehicle

4.2. Machine gun

Another main unit in this system is remote controlled and auto triggered machine gun. It is situated on the basement. User can send signal to operate the gun remotely using remote input device.

4.3. Machine gun rotation

The basement of this system is transportable but if the system is stay steady and not able to rotate then user can rotate upper part that is machine gun part 3600 so that user can target or see at any direction by rotating gun using remote input device.

4.4. Infrared laser gun

For accurate target at the aim user can use this laser gun. It is light emitting diode which generate long distance red laser beam. It is attached with machine gun so that it can move at machine gun's direction.

4.5. Emergency torch

Machine gun is also attached with emergency torch. In case of night operation user can use this to see front view.

5. Methodology used

The design methodology will be used for the given work. The details are as follows

5.1. Motion detection

Proposed system is less without motion identification system. This task is completed using logical and physical method.

5.1.1. Camera based motion identification.

Here system continuously captures video frames usingweb camera and then by employing image pattern matching (processing) methodology try to get themotions in current frames. For it system compares initial capture frame and current frame and show pixel difference in percentage**.**

5.2. LDR based light detection.

Light Dependant Resister is use to get the presence of natural or artificial light. Using this sensor system is try to get the light level is light level goes higher than predefined value then system will start emergency torch attached to the system. It will also

alert system by sending some signals

5.3. Temperature detection (thermostat)
Using thermister, system can get the environmental temperature level in case of hike in temperature beyond defined level system generates some alert signals and gives response to the user.

5.4. Controlling using voice command
We are controlling the vehicle on voice command. For this, system will use the SAPI functions. Here though mic user gives word then SAPI detects the word and generates word for our understanding as we got the word .We control the vehicle using commands Go, Stop etc. All these words having some frequency range and remembering this frequency is not our work .It is done by SAPI and we are using the SAPI to work for us programmatically.

5.5. Wireless connectivity.
Overall system is wireless for this system that uses two set of transmitter and receiver. One set is at user side and another is at vehicle side. These sets are used for wireless connectivity and communication.

As we have explained the block diagram of the system, now we can see the different parts of the project those are as follows. First is input from where user can give the input from keyboard .We have provided the different buttons on the form so that user can give input and even user can define the path as per requirements. Software is another part,which can manage all the things like management of the user interface and also controlling the parallel port.

First is transmitter, which gets the input from the system, and then generate the radio signals and these signals is detected b the receiver, which will detect the signals and control the car motions. To understand the concept just considers the remote car having the remote control and the car circuit, which will work as wireless circuit and control the car wheels.

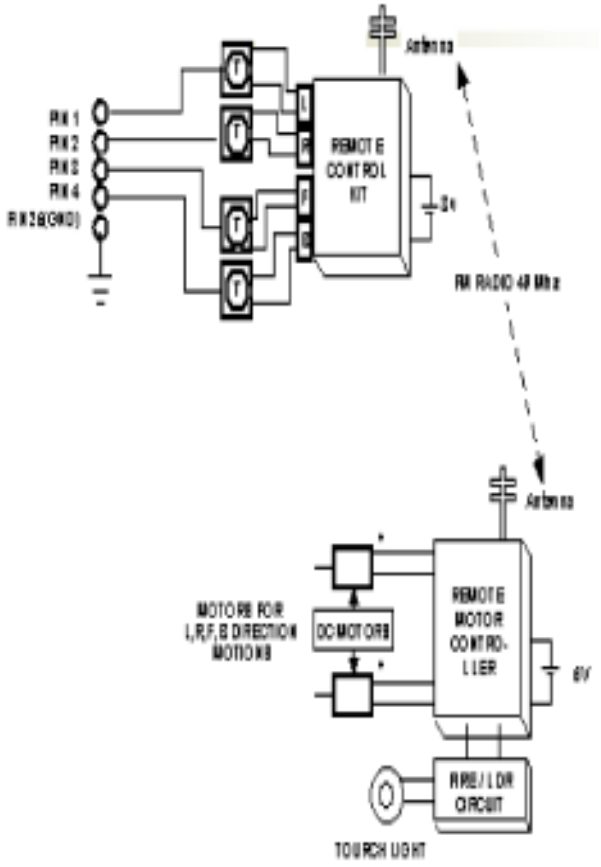

Figure 3. Remote controller of toy car

5.5.1. Remote controller.
As we are saying that were connecting the transmitter to the system then lets how it basically works and what is the logic behind it. Consider a remote controlled toy car which containing the Left, Right, Forward and backward. If we press any of this button then car remote will send some signals to car and car will detect this signals and control this DC motors. Now to control these buttons we will connect a transistor as a switch to each of the button and if we pass the current to transistor then it will control the car this is how we build the project circuit. Now at last we are passing the current to transistor from parallel port of the computer.

5.5.2. Hardware function.
This is all about the hardware part but main problem is software that what are the line of code to control the parallel port and how to signals to the parallel port. We have one function call "Outportb". This function sends the given data on give port. For that we need to give two parameter that is parallel port memory address that is 0x0378 and another parameter is data to write and this function will write data.

Figure 4. Hardware function to write data on port

5.5.3. Data flow diagram.
After all explanation see simple sequence of the execution: user gives the input. System executes the function. Function writes current on the parallel port. This current gets to the transistor switch which operates the transistor and generates the radio signals. These signals are then read by vehicle and it can control the car DC motors and car get the motions.

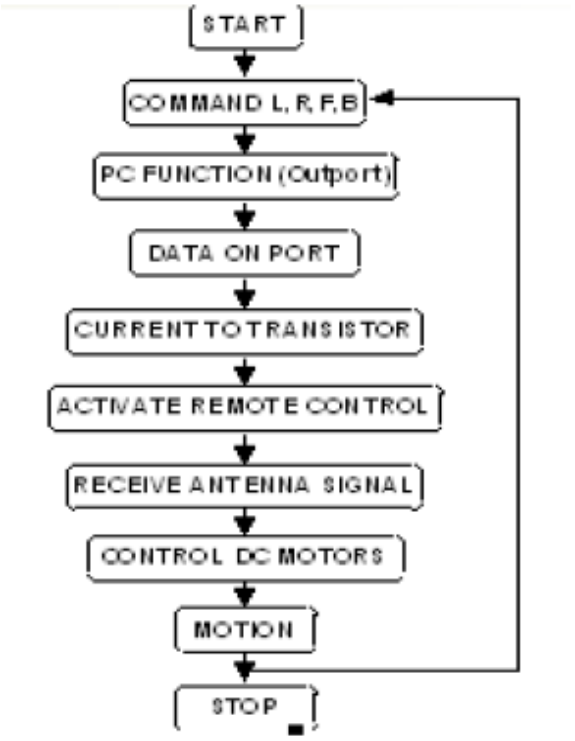

Figure 5. Data flow diagram

5.5.4. Main working logic.

Let's see all the thing together first software decides what to do then it uses some hardware controlling functions and write +5v on the parallel port pins. This current can ON/OFF the remote control switches which generates radio frequency. These signals get received by receiver circuit which can control the DC motors and last vehicle can have a motion.

5.6. System software

This is main interface operated by user which provides full system monitoring and controlling functionality.

6. Result and analysis

6.1. Software controller

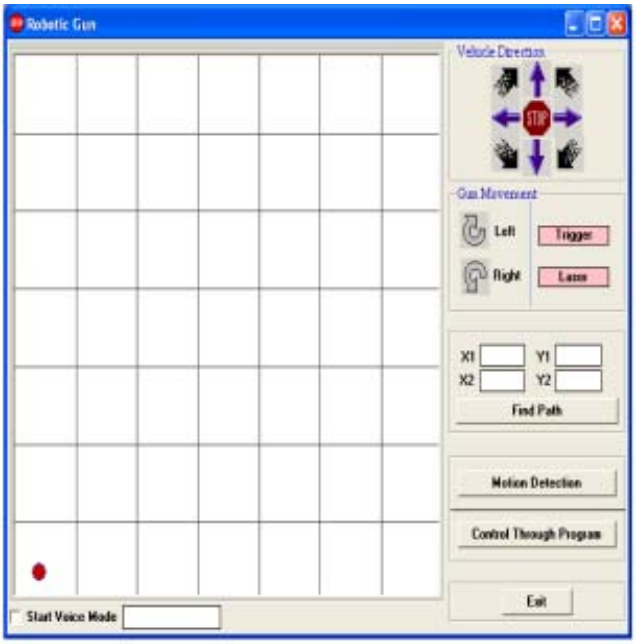

Figure 6. Software output

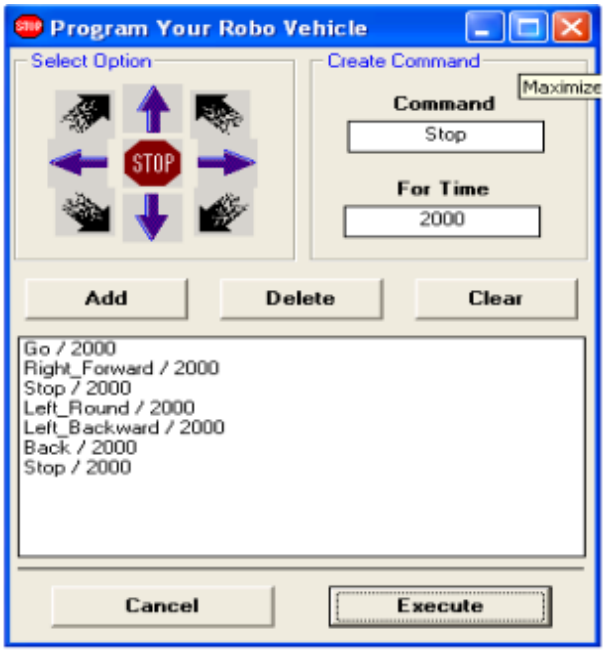

Figure 7. Controlling through program

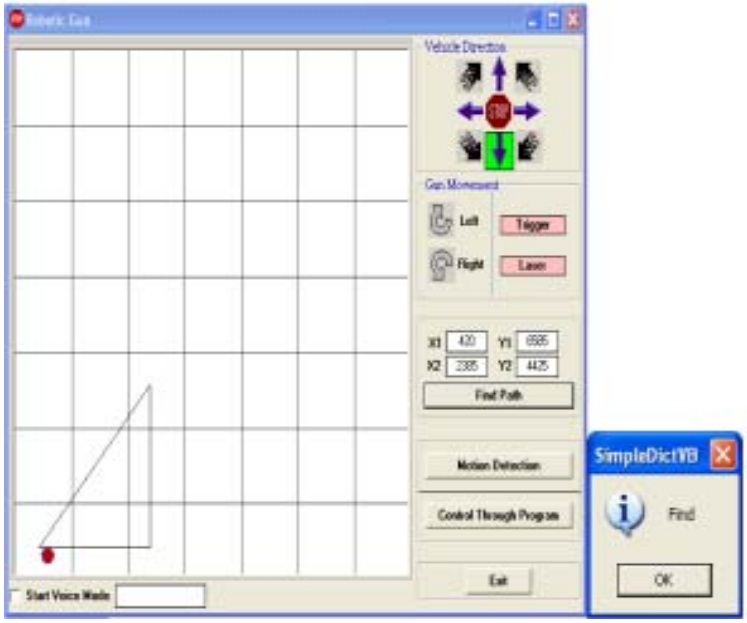

Figure 8. Finding path

6.2. Final model

Figure 8. Final hardware model

7. Application

Proposed system can be used in various fields like military, spying, tracking etc.

- In military it can be used for land soldier automation
- Using same technology we can develop different mini robots. These robots can be used for pipe line inspection for wiring checking and device faults detections.
- Same robots can be sending to detect different environmental statistics in remote area or in space.

8. Conclusion

The Wireless Automated Defensive Machine Gun system is mainly design to provide remote accessibility using wireless technology for land soldiers in battle field. With the sensors technology it will provide environmental statistics and also give full power of atomization system. In future with more development and enhancement it will be ready to work in real world environment.

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