

## **Design and Fabrication of a Model Remote Control Gun Fire**

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### **Abstract**

*Now a day's one of the most talked problem is lack of security in national and international level. Terrorisms and unwanted aggressions through borders has increased to high level. The border security forces are sometimes proving themselves helpless in front of sudden entry. For that purpose when some unwanted entry occurs the distance controlled gun firing system can easily locate it and starts firing to make them flee away or injured. This project is aimed at making the gun firing system which is consisting of a structural support with a gun mounted on it which rotate almost 180 degree along X-X axis and 120 degree along Y-Y direction , computer controlled electronics, and software to teach and control the arm. The mouser gun and a camera along with a remote controlled robot which will shoot object by tracking it via image processing software. Camera will track the object and move on its axis in the direction of robot and shoot it after a particular condition or a particular time as required.*

**Keywords:** Security, terrorisms, tracking, robot and computer controlled

### **1. Introduction**

An automatic firearm is any firearm that will continue to fire so long as the trigger is pressed and held and there is ammunition in the magazine/chamber. While both "semi automatic" and "fully automatic" weapons are "automatic" in technical sense that the firearm automatically cycles between rounds with each trigger pull, under conventional usage a merely semi-automatic firearm is not correctly referred to an "automatic weapon" or an "automatic firearm". The terms "automatic weapon" and "automatic firearm" are conventionally reserved to describe fully automatic firearms. Confusion can be avoided by this convention. A semi-automatic firearm fires one round with each individual trigger pull, while a fully automatic continuously fires rounds whilst the trigger is pressed and held.[1]

A fire-control system is a number of components working together, usually a gun data computer, a director, and radar, which is designed to assist a weapon system in hitting its target. It performs the same task as a human gunner firing a weapon, but attempts to do so faster and more accurately.[2]

"A story on NPR reports that the Tracking Point rifle went on sale today, and can enable a 'novice' to hit a target 500 yards away on the first try. The rifle's scope features a sophisticated color graphics display (video). The shooter locks a laser on the target by pushing a small button by the trigger... But here's where it's different: You pull the trigger but the gun decides when to shoot. It fires only when the weapon has been pointed in exactly the right place, taking into account dozens of variables, including wind, shake and distance to the target. The rifle has a built-in laser range finder, a ballistics computer and a Wi-Fi transmitter to stream live video and audio to a nearby iPad.[3]

This project is about making a gun fire without direct handling of a person rather making the control possible from distance. During this project some new terms and ideas are included by me like different terms of a firearm, its trigger mechanism, its diversities at trigger pulls, firearms auto-loading system for cartridges, required trigger pull of a typical firearm which can be implemented identically for many of the existing lightweight firearms, superior microcontrollers and interfacing via serial ports and object locating which have lead the project to success. The scope of the project includes the designing and building of the hardware and software for a compatible structure. The project is consisting of a structural support with a gun mounted on it, computer controlled electronics, and software to teach and control the arm. This project is aimed at making

mouser gun and a camera along with a remote controlled manual support which will shoot object by tracking it via image processing software. Camera will track the object and move on its axis in the direction of manual robot and shoot it after a particular condition or a particular time as required.

The project is aiming to ensuring border security and to stopping unwanted aggression at national level. Moreover, it can be fruitfully used in security system and in making a location free from unwanted mischievous. In brief, while working on the ideas of this project the enthusiasm in me leads to a very innovative applications which can be used in making a worldwide popular security enhancer.

### **Application**

- a) The machine can be applied at places where it becomes tough to have a person to ensure safety all the time. The place will be thoroughly monitored under the technical implementation of this machine with all the features it has and the processing system embedded in it.
- b) In low density area where animals can freely roam there this system can be used to make them senseless using required anesthetic fluid injected into them by pushing.
- c) It can also be applied at the the warfield at defending own transport like ballistic tank from any damaging through fast attack or any suicidal attack by quick response of the system featured with faster handling and shooting.

## **2. Design Technology**

This System to be act as to be complementary to a firearm a model has improved which would move as it is directed from a PC interfaced via a USB cable. A compatible program is to be made to compile microcontroller and other devices such as stepper motor synchronized with driver IC. Power to be supplied from AC Power Supply which is stepped down by a Center-tapped 12V transformer and then filtered with rectifier to convert into DC current for driving 3-12V stepper motor which would drive the whole device as directed as up-down, right-left, and making proper trigger pull.

### **Devices and instrumentation:**

- a) Microcontroller ( PIC 18F2550)2
- b) Motor driver IC (ULN2003A)
- c) 3-12v Stepper motor
- d) Transformer
- e) Rectifier
- f) TouchSwitch
- g) USB connection
- h) Some gear arrangement to make proper movement and sufficient trigger pull.

### **Rotation and movement by the gun**

The system is designed such that it can have a rotation of about 300 degree from its center so as to cover the total front area. It is done to impede the support from causing certain breakage of the structure behind it. Also to make the gun being stopped automatically after required movement before damaging the structure behind two touch switch has been introduced. The gun also can make 180 degree up-down movement with the rotation of worm wheel mounted with the shaft attached to gun.

### **Required rpm of trigger pull motor**

Pulling the trigger with sufficient force *i.e*, proper rpm is a momentous operation in executing the gun at faster handling action. As this system is built complementary with lightweight military rifles and semi-automatic firearms it's trigger pull has to maintain the same as those of existing. Getting N rpm from motor we get,

Range of typical trigger pull:  $\omega = 2 * \pi * N / 60$

Centripetal force at a distance r from center of a mass m is:  $F = m\omega^2 r$

Distance from center to mass of the arm which pull the trigger *i.e*,  $r = 1$  inch. or,  $r = 0.0254$  m

Trigger pull required,  $m = F/g$

As rpm of 250 is arranged here, calculating from above we get the pull of 3.9lb which is good enough for making smooth fire of the existing firearms.

### Execution of touch plate and switch:

Touch Switch moves with arm. The arm which pulls the trigger rotates clockwise, a spring is attached with it which works as a switch moves with arm between the two touch plates. The switch made there, is a spring so that when it stuck with those plate, does not damage because of its flexibility. While touches with upper plate motor will execute a reverse operation just after the trigger been pulled and thus moves backward till it touches the lower plate.

### 3. Circuit diagram

This circuit is a combination of different electronics and chips to make an arrangement to drive those motors. A brief description is given below:

- A microcontroller (PIC18F2550)
- 2 motor drive IC (ULN2003A)
- 2 Diode
- A 12V Down transformer
- Several resistors
- Several Capacitors
- Transistors
- A Relay
- AC power connection from transformer
- USB connection
- Necessary Wires & wire Connections.

The circuit diagram and complete circuit are shown in the Fig. 1

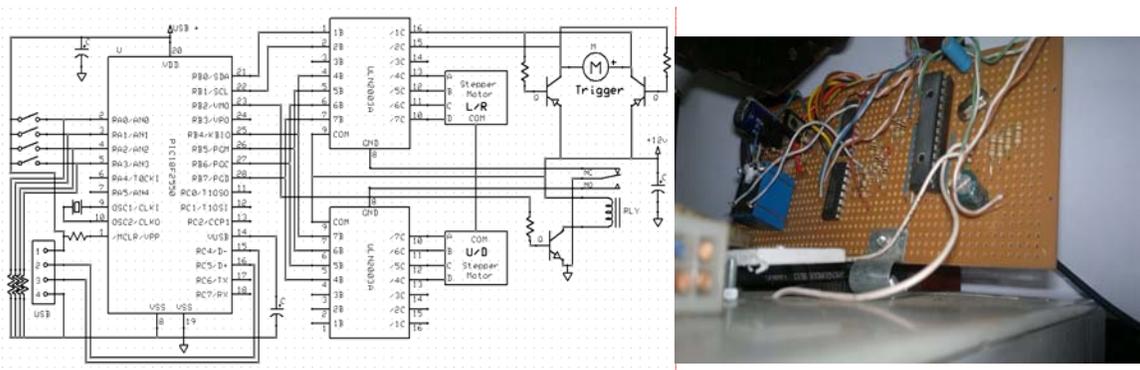


Fig. 1. Circuit diagram and circuit board of the remote control gun fire system

### 4. Working principle

This project is aimed at making a mouse gun and a camera along with a remote controlled manual support which will shoot an object by tracking it via image processing software. The photograph of the remote control gun fire system is shown in the Fig. 2

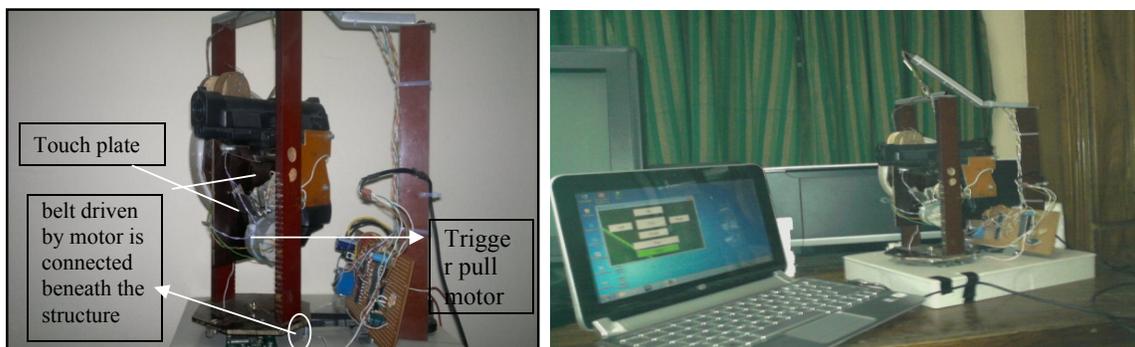


Fig.2 Fire gun controlled by USB compatible programmed application software via PC.

For a movement right-left, a motor has been mounted right behind the circuit and is connected with a drum situated beneath the structure of firearm. Motor and drum is connected by a belt. This drum is a combination of shaft which rigidly locked with the support structure and inside of drum is attached with two ball-bearing. And for an up-down movement, an worm drive and wheel arrangement is attached at the right side of the gun. The worm drive is driven by a 12V stepper motor as it is being commanded. Another motor is placed at the bottom of trigger. The rpm of this motor has been reduced by some reduction gear arrangement but proper for a good trigger pull for any typical gun with a trigger pull at 7-8 lb.

There has been an arrangement of two touch switch, one is metal support shaft mounted through the middle of structure and another is a tin plate. A spring attached with trigger pull arm which while touches the metal shaft, it gets a command to rotate the motor reverse. This has been built such that firearm just get onto trigger and pull it and then getting a command from touch switch to make reverse action. After that when it again touches another tin plate switch it gives a command to stop the motor right there. And the motor gets ready for another firing action when it gets any command.

The gun firing system is consisting of a structural support with a mouser gun mounted on it which rotate almost 180 degree along X-X axis and 120 degree along Y-Y direction , computer controlled electronics, and software to teach and control the arm. The mouser gun and a camera along with a remote controlled robot which will shoot object by tracking it via image processing software. When a command is given through computer at first camera will track the object and move on its axis in the direction of the robot and shoot it after a particular condition or a particular time as required

## 5. Discussion

During this project some new terms and ideas are studied like different terms of a firearm, its trigger mechanism, its diversities at trigger pulls, firearms auto-loading system for cartridges, required trigger pull of a typical firearm which can be implemented identically for many of the existing light weight firearms, superior microcontrollers and interfacing via serial ports and object locating which have lead the project to success.

Such system can enervate the defense of enemy by efficacious controlling at remote as less or no casualties of human life would occur. To be an assist of such attack into the region where it is impervious by direct persons appearing because of risk, be dominated.

This project has been fabricated as it can be executed at practical field as well as studying about firearms history, latest technologies and developments, related terms parts and techniques of sophisticated mechanism enriching knowledge in the field of ballistic science by overcoming the following draw backs

A rigid structure need to be made to support heavy load of riffles and firearms. For progressive trigger action it should be programmed such that the pull of arm on trigger would remain for the time it is needed. In that case the upper touch switch of metal shaft is to be removed and command should be given such that the arm attached with motor will pull the trigger and remain at that pulling action till another command is given to release it. Moreover, a huge improvement needed at imaging object. A night vision camera can also be recommended to make the system capable of shooting 24 hours.

## 6. Conclusion

This project is aimed at making the gun firing system which is consisting of a structural support with a gun mounted on it which rotate almost 180 degree along X-X axis and 120 degree along Y-Y direction , computer controlled electronics, and software to teach and control the arm. The mouser gun and a camera along with a remote controlled robot which will shoot object by tracking it via image processing software. Camera will track the object and move on its axis in the direction of robot and shoot it after a particular condition or a particular time as required.

## 7. References

- [1] [en.wikipedia.org/wiki/Automatic\\_firearm](https://en.wikipedia.org/wiki/Automatic_firearm).
- [2] [en.wikipedia.org/wiki/Fire-control\\_system](https://en.wikipedia.org/wiki/Fire-control_system)
- [3] [tech.slashdot.org/story/13/05/16/016209/a-computer-based-smart-rifle-with-incredible-accuracy-now-on-sale](https://tech.slashdot.org/story/13/05/16/016209/a-computer-based-smart-rifle-with-incredible-accuracy-now-on-sale)