Review of Automatic Gate Opening

Mulani S.J.[1] , D. R. Sivangekar,[2,] V. V.Patil[3]A. P.Jadhav[4] ,N.N.Salunkhe[5], R.R.Patil[6]

[1]Asst. Prof. Department of Mechanical Engineering

AGTIS' Dr. Daulatrao Aher College of Engineering

Karad, India

[2,3,4,5,6]Graduate students Dept. of Mechanical Engineering

AGTIS' Dr. Daulatrao Aher College of Engineering

Karad, India

shivangekardr@gmail.com[2],

vishpatil2266@gmail.com[3]

Abstract- **The aim of this project is to automate, unmanned opening of college sliding gate by using the remote control device.The objective of this project is to manage the control system of college sliding gate using the remote operated. When vehicle arrives near the gate then security man which have remote for opening gate, he press the opening button onRF Remotethen open the gate and after going vehicle then it will be closing. It works on Rack & Pinion Mechanism.The remote will be operated in 100 m distance from Microcontroller Based Circuitsensing kit. It is helpful when security is away from gate or he required time to come on gate. So that time he open gate automatically by using remote.This remote sensing device is aimed to save time, labor etc. Research work has been done on different factors of Automated Gate opening .So, this paper deals with the study of Automated Gate opening.**

Keywords- Rack & Pinion Mechanism, Microcontroller Based Circuit, RF Remote

I.INTRODUCTION

The need for automatic gates has been on the increase in recent times. The system described here incorporates the use of a microprocessor as a controller in achieving the aims of this project. It is no exaggeration to say that the microprocessor has revolutionized the electronics industry and has had a remarkable impact on many aspects of our lives (1999). the gate.

Almost all areas of technology have started taking advantage of the inexpensive computer control that microprocessors can provide. Some typical applications include: electronic games, CD players, automatic braking systems, industrial process controls, electronic measuring instruments, automobile emission controls, microwave ovens, traffic controllers, and a rapidly growing number of new products.

The automatic gate described here automates the entrances to parking lots of residential homes, organizations, automobile terminus, and public car parks. It uses a remote control convenience to avoid the stress of manually opening and closing the gate. The technology used eliminates gate monitoring and manning by human beings. The gate uses a state-of-the-art entry system. The gates have to perform gyrations – open, auto-reverse, stop, fully close and fully stop.

The automatic gate is not a security device and should not be construed as one. It provides convenient access and intelligent features that makes it distinct from all other gates which brings it so close to a security device. Now days, we can see that many of people in big city use the automatic gate system at their home. This is happen when they are often to use transport like car to work. To open or close the gate they need to step out side from the car to open it. It just wastes the time. So, they prefer to the automatic gate system because it can savetheir time and energy. They just need to push the remote control while in the car to open the gate. We rarely to see people outside from the city using the automatic gate system at their home.Probably because the cost to install this system is high.

The function of automatic gate opener is to help user open or close the gate automatically using electrical source without manually pull or push the gate. There are two types of operator. First, the swing operator.This type usually using at home.Second, the slide operator.This one often to use at industry or large building.

The problem that occurred for using this system are the cost and how to install this part to the gate. The cost will include cost of installment and maintenance. The costs are quite expensive. There will be a problem during how to install this system to the gate.

To solve this problem, on this project, there will be design the simple mechanism operating gate opener. It has two arms that mount each other. First arm is mounting at the motor and the second arm is at gate. When the motor is on the arm will pull or push the gate to open or close. The motor will be store in the box and will install at the pillar .

II.   LITERATURE REVIEW

Chai FookSiang[1]Automatic gate is one of the most preferable domestic intended to provide easy access to gated home. There are three types of automatic gate mechanism, such as sliding, screw drive piston and swing cubic underground. Designs available today are limited only to the three types mentioned. Products available in the market are quite pricy, even when installation and maintenance cost is not yet been considered. Most of the products available in our country are imported from foreign country. The objectives of this project is to study, analyze, and develop a new mechanism that concern with the cost reduction and the mechanism produce should be safe and reliable as well. Here, different type of analysis method was in used in order to develop a proper automatic gate mechanism. Those methods are finite element modeling and mechanical design concept and theories. Stress analysis is done by applying variable maximum loaded stress to ensure the product life service is sustainable. Analysis done also helps in order to select proper material and component specification or sizes for the product development. Therefore, the durability assessment results are significant to reduced the cost and improve the product reliability so as to gain customer confidence. In order to improve the designed mechanism, vibration factor should be take into consideration and more features should be provided.

Amusa K. A et al[2]Access to a driveway, garage or car park may be restricted for the purpose of toll or ticketing collection or when maintenance work is being carried out. In some situation, it may be introduced in a driveway to check excesses of road users in terms of speed. Two approaches for the control of the barrier to a car park are explored and construction of prototype is carried out, in other to demonstrate workability and suitability of the design.

MohdTarmizi Bin AbdAziz[3]This project presents mechanisms of automatic gate opener swing operator. The objectives of this project are to design automatic gate opener mechanisms, fabricate and assemble gate opener components. Mild steel and galvanizes iron were used as material in this project. The structural three-dimensional solid modeling of mechanisms automatic gate opener was developed using the solidworks drawing software. The arms that mount to the gate were fabricated using metal inert gas welding. The box for store the motor was fabricated using turret punch machine and bending machine. Result for
the first test is the gate not move because the output power that need to push or pull the gate not enough. Result for the second test is the gate can move because the gate is lighter than the first one. The automatic gate opener can be added with remote control system. Therefore, the gate can be opened from more distance.

O. Shoewu and O.T. Baruwa[4]The work presented here outlines the development of a microprocessor based automatic gate. The inconveniences encountered in gate operations has called for an immense search for solutions. The microprocessor based automatic gate offers everything necessary to put an end to these inconveniences as it incorporates an intelligent device (microprocessor).

Specifically, the system described in this paper monitors two gates, the entrance and exit. The automatic gate senses any vehicle approaching it. It automatically opens, waits for a specified time, and closes after the time has elapsed. As soon as the gate closes, the system counts, registers, and displays the number of vehicles.

The system also serves as an automobile parking control unity by periodically checking the number of vehicles that have entered the area and computing the available space limit in the parking area. Once the available space limit is reached, the system triggers an alarm for a specified time and the entrance gate remains inaccessible until another vehicle comes out through the exit gate.

The automatic gate developed in this project is unique in that it is controlled by software, which can be modified any time the system demands a change.

LovemoreGunda et al[5] Radio Frequency Identification (RFID) is an auto identification technology which uses Radio Frequencies (between 30 kHz and 2.5GHz) to identify objects remotely. The paper describes a system which does the job of detecting, billing and accounting for vehicles as they pass through a tollgate using RFID as the identification technology. In the design, a frequency of 928MHz is used as it is in the Industrial Scientific and Medical (ISM) band. The system is a great investment in the transport industry. It reduces the common hustles in accounting for the movement of goods from point to point. The design can be further developed to aid the satellite surveillance systems once all toll gates are networked. An RFID tag is programmed with information in the form of an Electronic Product Code (EPC), which can be read over a considerable distance so that its contents identify the vehicle and enhance a transaction to be undertaken with respect to the specific tag identity taking advantage of radio frequencies' ability to travel longer ranges with better data capacities and high speed attained with maximum accuracy. The design has been implemented as a miniaturized prototype.

JitendraChaudhary et al[6]A microprocessor controlled automatic door opener including means for detecting the velocity and direction of travel of the door. The micro-controller evaluates detected changes in either the velocity or direction of travel to determine the cause, and either reverses door travel direction or ignores the detection. The settings of the door are stored in the memory of the microprocessor. The microcontroller will regulate the opening and closing speed and the direction of door travel depending upon a preprogrammed

sequence. The door control mechanism is able to differentiate between these internal factors and external obstructions.

Alfredo del Ríoet al[7] Teaching/learning microcontrollers in the laboratory has been traditionally carried out using general purpose simulators and/or evaluation boards. In-circuit emulators are not widely used because their high cost. This paper presents UVI51, a software tool developed for teaching/learning the 8051 microcontroller in the laboratory and/or the classroom. UVI51 includes an assembler, a multimicro simulator, a logic analyzer, and an assistant. The tool allows to simulate systems consisting of up to 4 microcontrollers plus a set of external peripherals. Both the CPU core and the embedded peripherals of each microcontroller are simulated. Everything in UVI51 has been designed with the educational perspective in mind. A set of windows depict the configuration and behaviour of every embedded peripheral. UVI51 is currently being used in several courses on microcontrolllers at University of Vigo (Spain) and also at the college level. The tool is suitable for learning nearly everything about the 8051, ranging from the CPU and instruction set basics to complex use of timers, interrupts and the serial port. This paper shows the benefits of using UVI51 as an alternative to traditional instruction tools.

Ch. Naga Koti Kumar et al[8]This paper mainly focuses on the controlling of home appliances remotely when the user is away from the place. The system is SMS based and user uses wireless technology (GSM). The system uses GSM technology thus providing universally access to the system for automated appliance control. GSM (Global Systems for Mobile Communication) is vastly used because of its simplicity in both transmitter and receiver design, can operate at 900 or 1800MHZ band, faster , more reliable and globally network . This project is designed for seven power grids. 8051 Micro Controller is the heart of the project.
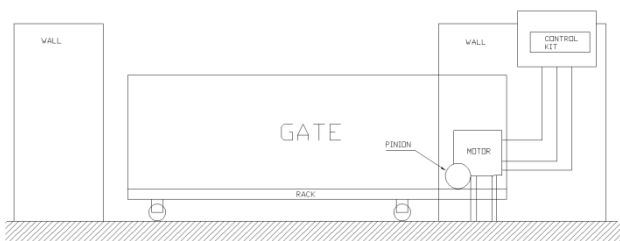
III. EXPERIMENTAL SET UP

Fig. Block Diagram Of Experimental Setup

SPCIFICATION

RACK:

The length of rack is 14 ft. to do well motion of gate in specified length.

The number of teeth on rack is 426.

The weight of rack is approximate 37 kg, when it is fitted to the gate then total weight of gate become 70 kg approximate.

The pitch of rack is 1 cm

SPUR GEAR:

Pinion is attached to the motor shaft, the teeth of pinion is mesh with rack teeth.

Motion is given to the pinion by motor shaft and these motion is send to the rack, and combination to all these gate will slide on guide way.

The number of teeth on pinion is 40.

The outer diameter of pinion is 126 mm

The weight of pinion is approximate 2.5 kg

MOTOR:

Motor which is used in our project is automatic speed reduction.

Initial rpm of motor is 1440 rpm

The rpm get after speed reduction is 50 rpm

The motor is of ½ HP

Motor is used to give drive to the pinion directly and indirectly to rack.

Table No.1-Motor Spcification

Make	
Drive type	AC ½ HP
Number of axes	1
RPM	50
Weight	3.5 kg
Supply voltage	230 volt
Time to complete 1 rev.	0.83 sec

TURN BUCKLE:

Turn buckle is used to engaging and disengaging the gear from rack.

This is attached to the motor mounting plate and to the motor stand.

When any problem occurs then we want to disengaging the gear from rack fast so that's why easy mechanism which required less time and anyone will handle this so we use turn buckle.

ELECTRIC KIT/REMOTE:

The electric kit and remote device is used to open gate automatically.

Remote will be operated in 100 meters distance from its sensing kit. By using this remote we open the gate whichever we want to need.

IV.   CONCLUSION

From the study of above literature survey we find out the following point that most important to project data.

- Project gives us the lots of experience about work and mechanism.
- This project is a very useful and less costly and has future scope.
- It also teaches us about team work.
- Human effort will be minimize for opening of the gate.
- Well time management occur.

REFERENCES

[1]. Chai Fook Siang "Design Of Automatic Gate Mechanism"
[2]. Amusa K. A. ,Nuga O. O., Adetomi A. A. "Design And Construction Of Automated Barrier For Car Park Gates"
[3]. MohdTarmizi Bin Abd Aziz "Development Of Automatic Gate Opener Mechanism"
[4]. O. Shoewu And O.T. Baruwa "Design Of A Microprocessor Based   Automatic Gate"
[5]. LovemoreGunda, Lee Masuka, Reginald Gonye, Samson Mhlanga and LungileNyanga "RFID BASED AUTOMATIC TOLLGATE SYSTEM (RATS)"CIE42 Proceedings, 16-18 July 2012, Cape Town, South Africa © 2012 CIE & SAIIE
[6]. JitendraChaudharyHemrajKumawat"MicroprocessorBased Automatic Door Opener"
[7]. Alfredo del Río1 and Juan José Rodríguez "Uvi51:A Simulation ToolFor Teaching/Learning The 8051 Microcontroller"
[8]. Ch. Naga Koti Kumar, Y.V. Raghu Babu, A. Gamya, P.Jainath ,M. Vijay."Design and Development of Activation and Controlling Of Home Automation System VIA SMS through Microcontroller."International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 2, Issue 2,Mar-Apr 2012,   pp.1349-1352