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RACK AND PINION OPRATED AUTOMATIC SLIDING GATE

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ABSTRACT

Automatic gate is one of most usefully thing to use in companies, colonies, collages and schools. There is some type to operate a gate such as a sliding on screw or on rack and pinion, piston operated, rotary. Design is available for some type of operation and it is most costly also When installation and maintenance cost is not yet been considered. Most of the products we used in our country imported from foreign country. The objectives of thisProject is to study, analyze, and develop a new mechanism that is cheap, safe easily available and installation is simple as well.. Here, different types of mechanism are used to operate gate. Those methods are finite element modeling and mechanical design concept and theories. So we have to analyze a stress, load, and other things related to deign to select material, size of material. Therefore, the durability assessment results are significant to reduce theCost and improve the product reliability. In order to improve the designed mechanism, vibration factor are conceder and more features provided.

I. INTRODUCTION

Gates are commonly used now days at residential area and industrial area. A gate is a point of entrance to a space enclosed by walls. Gates may prevent or control Entry or exit of vehicles and human crowd. Today many gate doors are opened by an automated gate operator which gates come with many special features. The need for automatic gates has been on the increase in recent times. The system described here the actuator to control the movement of the gate automatically. 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 less the stress of manually opening and closing the gate and decreasing a requirement man power.. The gates are work with a many features like forward direction , reveres direction, automatic stop when problem occur and on sensing a movable parts around it..

Those gates come with different type of mechanism such as sliding, swing, folding, and barrier gate. Those mechanisms have their own working principle and feature but, automatic gate design seem limited at the local market. Most of the product is supply by a outside provider. which cost is higher and not in beget. Cost study and new mechanism design, can be Marketable toward customer at lower cost and new innovation of auto gate
mechanism can enhance local design capability.

II. PROBLEM STATEMENT

Nowadays, the automatic gate mechanisms have been improved and developed

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with different kind of features. These features have increased the cost of production and thus cost is not with a installation cost. Many people especially with low income
are not afford the gate mechanism. The gate mechanism needs a very
skilled person to install the mechanism to the gate. Development of automatic gate mechanism
should help in minimize a cost of product and easy installation of mechanism.

III. OBJECTIVES

Objectives for this project refer to the mission, purpose, or standard; minimize cost simple mechanism that can be reasonably achieved within the expected time and with the resources which are available. The objective of this project is to design an automatic gate mechanism for collage with sliding gate with weight of 250kg of the gate. Cost reduction and ease of installation are also considered for this mechanism.

IV. PROJECT SCOPES

The scopes for this project are to study many type of mechanism and working there principal mechanisms. Those Mechanisms include sliding gate. Design and sketches in rough view, are compare with a best design and choose a best design. The design should consider about the
portability and cost. Based on the design, a prototype is constructed for mechanism
rough view. And also ensure the mechanism can withstand high torque.

V. LIMITATION

The limitation for this project is hard to collect data about the automatic gate
mechanism. Automatic gate are normally for commercial purpose and it is impossible
for the product collage to expose their own design and working principle of the
automatic gate.

VI. LITERATURE REVIEW

This chapter will provide the detail description according to title of design of automatic gate mechanism. Automatic gate mechanisms act as the actuator part for the gate system and it provide motion to a gate in order to open or closed the gate. By using a servo motor control remote we control the direction of servo motor which is used to operate a gate.
a gear box is attached to a motor on which output shaft pinion gear is mounted. by movement of this pinion gear is slid left or right beclouds of rack which mounted on it.

VII. GATE DESIGN CONSIDERATION

A gate is a potential traffic hazard, so it is important that you locate the gate far
Away from the road to eliminate the potential of traffic getting backed up. This distance is use how to operate a gate and speed of operation of gate. Gate must properly install and work wary well before start its use regularly. Pedestrians should not use a vehicular gate system.
Exposed, reachable pinch points on a gate are potentially hazardous and must be eliminated or guarded. the controls of operating system must be secure to prevent a unauthorized use of controls. the control panel of a gate operation is place far away from gate so that the controller cannot touch or came in contact of gate when it is in operating condition this gate is not operate by a operate if someone is pass from it or extend their arms or legs in it. so at this time screen is provided at control room or window from which controller watch a hole gate.

VIII. METHODOLOGY

Basic working design of gate

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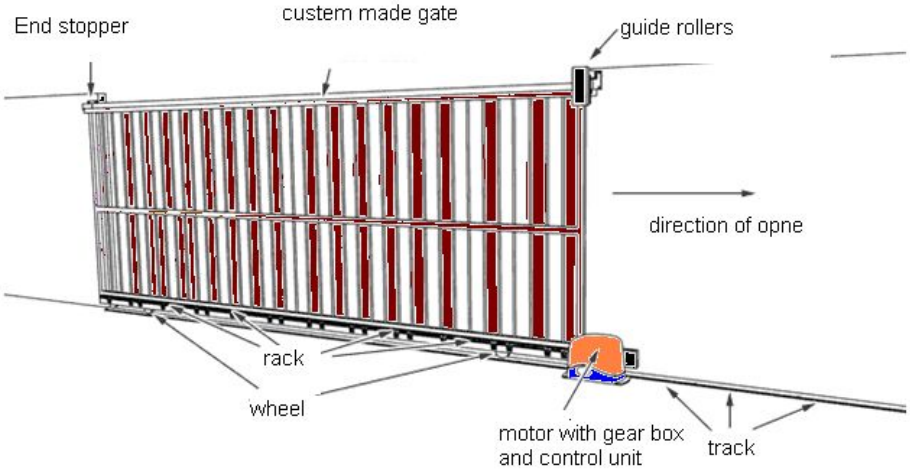

basic design of rack and pinion oprated gate

1. Rack and pinion design

No.	Item	Symbol	Formula	Example	
				Spur Gear	Rack
1	Module	m		3	
2	Pressure Angle	α		20°	
3	Number of Teeth	z		35	—
4	Coefficient of Profile Shift	x		0.6	
5	Height of Pitch Line	H		—	20
6	Working Pressure Angle	α_w		20°	
7	Center Distance	a_x	$\frac{zm}{2} + H + xm$	39.3	
8	Pitch Diameter	Pd	zm	90.00	—
9	Base Diameter	d_b	$d\cos\alpha$	80.00	
10	Working Pitch Diameter	d_w	$\frac{d_b}{\cos\alpha_w}$	85.13	

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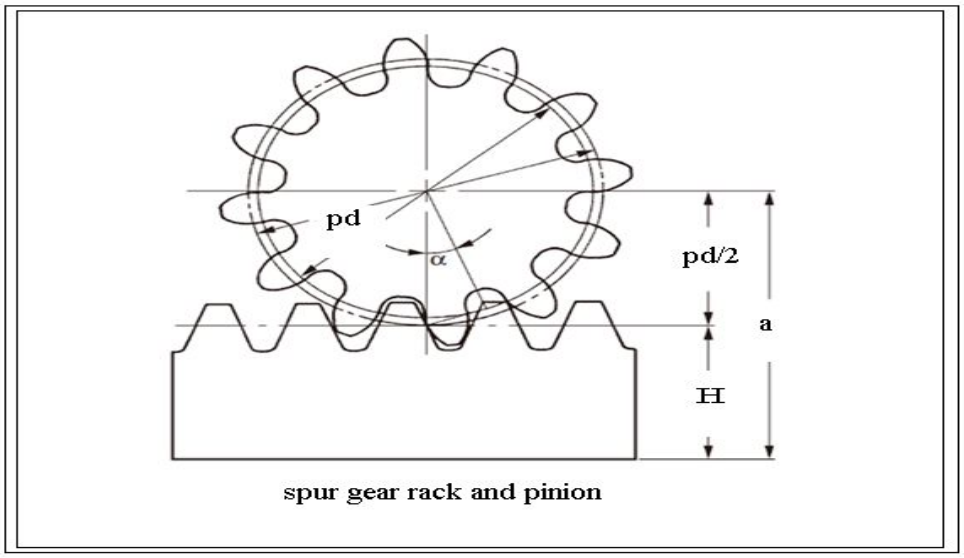
Basic design of rack and pinion.



spur gear rack and pinion

IX. CONCLUSION

This automatically gate is most useful and simply to operate at any condition.
Because of atomization no manual force requires.
Time of opening and closing gate is 35min.

X. EXPECTED OUTCOME

Designed and fabrication of automatic gate mechanism simple, resistible, simple to maintain, safe to operate and less in cost compared to other types of automatic gates.
The automatic gate mechanism should also be able to function properly when installed
on normal gate with weight of 250 kg.

Advantages –

- Designed and fabricated with rectangular hollow sections, MS sheet and joined by welding.
- The design and construction of gate minimize the risk and accident.
- Wide range of models for gates weighing from 250kg to 450 kg
- Operate a gate manually is power problem occur.
- Because of compact design silent operation.
- Electrical wiring of motor is safe and not come in direct contact of living things because of underground installation. Motor is protected for all things like dust, water, rain etc.
- The electronic control is use to open, close, emergency stop, partial opening of gate, reveres safety etc.

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