AUTOMATIC GATE OPERATING DEVICE

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ABSTRACT: Looking at the importance of safe operation of railway crossings this invention is focused on a safer and labor free function of railway gate. There are more than 34,000 railway crossings in India today, out of which more than 12,000 are not attained by operator. More than 60% of accidents take place at such inhumane railway gate crossings. The above problem can be solved with automatic gate operating device. In case of railway crossing gates this device would be the best option as automatic railway crossing device. This invention is on automatic railway crossing with or without human operator to execute a safer crossing function. This device is more convenient, eco friendly, reliable and efficient as it works on solar energy or just 12V D.C supplies. Economical innovation with affordable cost of safe railway and vehicle crossing with 3000 INR. The human errors are eliminated due to use of electronic circuits. The cars crossing roads are alerted two times, initially the signaling device alerts drivers about the arriving train and then a specific time the gates get closed. The timing of gates opening and closing can be controlled using potentiometer provided in timer circuit.

Keywords: LDR circuit, Timer IC 555, Automatic railway crossing, Signaling devise, Solar panel.

INTRODUCTION:

The present invention is automatic gate operating device and can be deal with auto functioning and controlling the crossing gates. This is the perfect automatic gate.
output of LDR is connected to the high power gate controlling motors. When the output is high the gate will be closed and when it is low then the gate remains open for the vehicles on the road crossing railway line. For safety purpose there are two LDR and two timer circuits used in the actual model. The first set is used to control the signal lights near the crossings and another set is used to control the gates. Then the train passes over the first LDR along its way. Due to the change in intensity of light falling on the LDR due to shadow of train passing over, initially the signaling lights and siren are turned on. It behaves as signaling devise which can instruct the vehicles crossing that the train is arriving. For signaling purpose the signal as well as Siren is used so that the people becomes more aware of arriving train. Now when the train passes over the second LDR the gates for the vehicles are closed and the train is having no obstacle on its way which is the safest function of railway crossing. When the train completely passes the junction the gates are opened after some time as the timing set into the timer circuit. After the completion of all this process the siren and signaling lights are switched off. Timing related to running time of signaling device and gate switching are completely adjusted using timer circuit. Depending on the situation present near the crossing the timing is to be adjusted using potentiometer.

**Background :**

This invention is the solution of number of accidental problems in transportation especially in railways and junction roadways. There is urgent need of a technique to solve the issues related to railway crossings without operator. Large number of people use railway as their primary source of transport hence the safety of this transport comes first into account. Keeping this into mind this invention is designed to give maximum safety to the railway crossings using more efficient ways like electronic circuits to control the gate functioning. It comes out from a pure Electronic and Mechanical engineering background. The present warning systems in Railways are based on conductivity due to train pass. This automatic railway crossing circuit doesn’t have chance of hack.

**DESCRIPTION OF AUTOMATIC GATE OPERATING DEVICE :-**

The description of invention is categorized into the different subsections such as field of invention, Background of invention, Objectives and summary of Invention, Brief description of figures and detailed description of the invention.

The present innovation relates to the field of safety in transportation and use of reliable and efficient techniques to make the railway crossings more safe and secure. The circuits used in this invention are directly related to electronics field. Target beneficiaries of the proposed work are Railways and other transport vehicles with or without human operator.

Objectives of present invention is as follows,
1. To provide automatic safe railway crossings and any type of gate.
2. To use cheap and more efficient technology to make railway gate crossing vehicles alert.
3. To decrease number of human errors by using electronic circuits.
4. To decrease number of the human operator, labor in opening and closing the gates.
5. To decrease the switching time of gates in about micro seconds.
6. To use solar energy as the main source of energy.
7. Building a hack free system to control the railway crossing gate and any type of gate.

**Detailed description of system:**

**LDR :-**

The innovated circuit activates a relay, based on the change in intensity of light falling on the LDR. Contrary to its normal use, an astable or monostable multivibrator, the type 555 IC in this circuit functions as a comparator. This circuit uses unusual application of LDR. The operation of IC 555 is as follows:
The output goes high on reception of trigger pulse at input 2. This pulse is just a trigger whose voltage is 1/3 of input voltage supply. The output goes low again when the voltage at the second pin 6 exceeds 2/3 of the input voltage. In this present system the second pin is not used instead this pin (6) is connected directly to +Vcc. In principle the supply voltage for the circuit must equal the coil voltage of the relay. Do not apply more than 16V, as this can damage 555 IC. The RC time constant of the resistors and capacitors is maintained about 10s. By varying the resistance value in potentiometer used the timing of output to be high can be changed. The circuit can also be used as two state switcher depending on the value of resistance in potentiometer.

**Signaling device:-**

It is the combination of traffic indicator lights and a siren used to alert the vehicles about the arriving train. Initially when LDR gives no output, the siren will be off and the indicators will be showing green lights to the vehicles indicating that they can cross the railway crossing. LDR can be set at any distance from the gate as this LDR will send electronic signal in a second. In case of railways we must set LDR at minimum 1 km. distance from railway crossing. When the train arrives about 1 km from the crossing, the signals turn red and alert the vehicles about the arriving train. At the same time the siren turns on for alerting the drivers. When the train arrives the crossing at 500m from the crossing gates, the gates turn closed for the vehicles safely. The specific time can be set into timer circuit after passing train from the crossing to open the gates. After this the signals turns green and siren turned on for vehicle crossing.

**Following materials are used for experimentation.**

**Table I : Material used**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>LDR Circuit</td>
<td>Point no. 1</td>
</tr>
<tr>
<td>02</td>
<td>555 Timer Circuit</td>
<td>Point no. 2</td>
</tr>
<tr>
<td>03</td>
<td>12 V D.C supply</td>
<td>Point no. 3</td>
</tr>
<tr>
<td>04</td>
<td>Signaling Device</td>
<td>Point no. 4</td>
</tr>
<tr>
<td>05</td>
<td>Connecting wires</td>
<td>Point no. 5</td>
</tr>
</tbody>
</table>

**Description :**

**Point no. 1 :**

It is the LDR circuit as shown in Diagram: Fig. 1
Point no. 2:
It is the timer circuit using 555 timer IC: Fig. 2

Point no. 3:
The supply of constant 12V D.C is used to power both the circuits.

Point no. 4:
It is an combination of Siren and Signals used to alert the crossing vehicles they work on different energy source.

Point no. 5:
They are used to connect the two circuits and the two gates controlling motors and signaling device.

Brief Description of Figures:-
The preferred and alternative embodiments of the present invention are described in detail below with reference to the following figure Diagram :- Below are the detailed circuit diagrams of electronics used.

Conclusion:
1. This circuit is a very safe and secured functioning of railway crossing gate.
2. This circuit is set on solar power which saves energy.
3. The system functioning is hack free and hence no external body can disturb the functioning of railway crossing.
4. The timing for which LDR output remains high can be changed with using potentiometer in timer circuit.

5. This purely electronic automatic kit and no need of labor and skilled operators after setting this with railway crossings.

6. The human errors in controlling the railway gates are eliminated by use of this automatic electronic circuit kit.

7. Economical way of making railway crossing safe as one automatic electronic circuit kit costs only 3000 INR.

8. Instant operation with output of LDR and no time lag between the notification operation.

REFERENCES :-
