

# Automated Gate Railway Crossing Road using Steel Kerb

Mona Omer<sup>1</sup> and Dalia Mahmoud<sup>2</sup>

<sup>1,2</sup>Control Department, Al-Neelain University, Khartoum, Sudan  
<sup>1</sup>habiba7253@gmail.com and <sup>2</sup>d.daliamahmoud@yahoo.com

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## Abstract

Road crossing railways, some results in accidents causing death and injuries. To help solving this problem and reducing the losses we think about automatic alarm and control system which force the traffic to stop while the train is passing through the road using storing steel kerbs to close and open the gate. Visual and audio able alarms are used. Microcontroller, hydraulic system and sensors are used to result in a fast operation and time saving.

**Keywords:** Microcontroller, Infrared Switch, Pneumatic System Kerbs.

## 1. Introduction

In our country (Sudan) where there wide areas and long distances, they are thinking to increase the railways network services because of cheapest cost. So increasing in railways this creates an increase the level crossing points.

Now there are no gates except manual ones at cities, but some signs and labels exists just warn the road user. Therefore we expect the increase in accidents. Our project is to use automatic controlled gates (kerbs) at the level crossing points. In searching and comparing some similar projects ahmedsalih1 and AciM.katalil in their system used infrared sensors as train arrival and motor drive (step motor and servo motors) for the detection and gate actuating. Karthik Krishnamurthi used infrared, magnetic and vibration sensor and servomotor with microcontroller we add some modification and development to increase the efficiency and performance. So we used microcontroller Atmega16, limits Switches, infrared, hydraulic, pump and cylinders to raise and lower the steel kerbs which force the traffic to stop.

## 2. Review

Whenever a train approaches from one of the two directions of the cross point, the train arrive sensor on, input signal will be fed to the microcontroller which sends a command to alarms of the gate, after a certain time which is enough to clear the crossing level. Two steel kerbs (Gates) raise up to block the road against traffic. After the last car of the train passes the cross point and a safety time passes the gate will open and a green light will lit instead of the red stop one. Show bellow to fig.1 (Road crossing railway diagram)

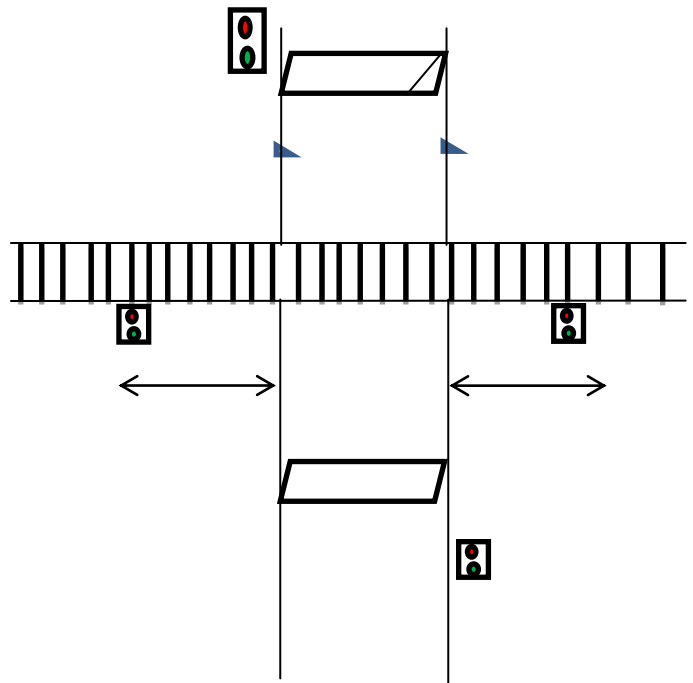


Figure 1: Road Crossing Railway Diagram

### 2.1 Limit Switch

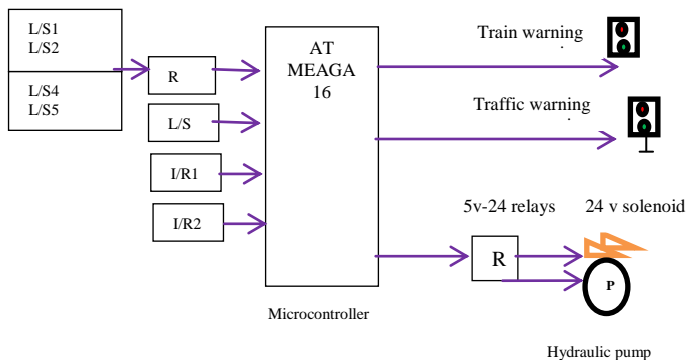
L/s1, L/s2, L/s3, L/s4, L/s5

Infrared switches: I/R1, I/R2  
 Traffic light: TR/L1, TR/L2 road signs  
 Warning light for train: TR/L3, TR/L4  
 Kerbs gates: k1, k2

### 2.2 Hardware Components

- At meg 16 microcontroller programmed for the operation
- Heavy duty limit switches .
- 24volts two passes hydraulic oil solenoids.
- Infrared sensors for the crossing objects detection (traffic)
- Hydraulic pump 24 volts ds.
- Hydraulic actuated cylinders to raise and lowers the gates.
- Back up batteries
- 48v dc relay

As showing figure 2(road crossing railway block diagram)

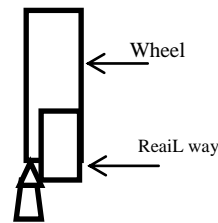
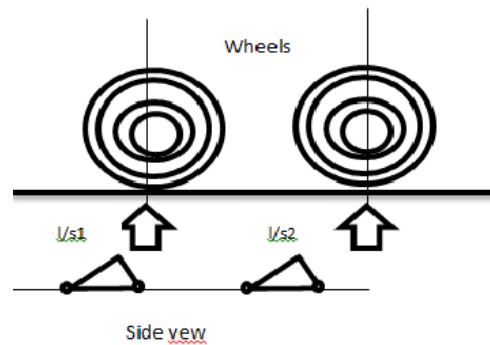


**Figure 2: Road Crossing Railway Block Diagram**

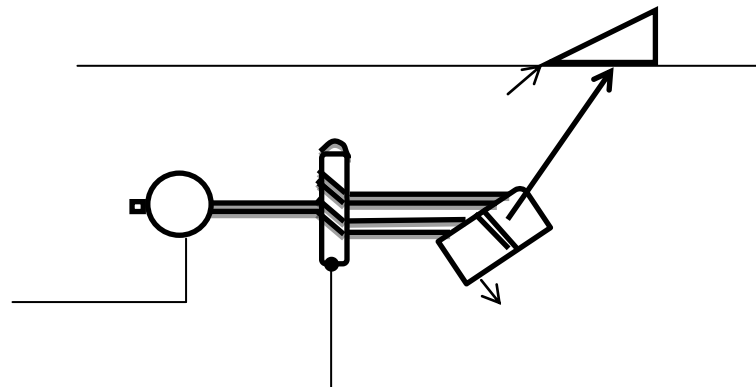
### 3. System Operation

We use two limit switches (L/s) as train arrive sensor on each direction of the date, located at distance from the gate 5km which give the train a time to slow down and completely stop in case there is a truck stocked on the train line at the

gate. this L/s are installed beside one line of the railway with space equals to the length between two series wheels of the train, and electrically connected in series to be switches at the same time by the train two wheels closing the circuit which operates a relay that switches in put 5 volts to the microcontroller to realize the train arrival and nothing other as shown below in.fig.3:L/s installation



**Figure 3: L/s Installation**



**Figure 4: Gate Activating Pneumatic System**

A limit switch L/s 5 located at the gate beside the train line to be operated by the train wheel. Come on and off when the wheel passes this switch rested a software time which is enabled the gate closing signal, the priested time of this timer is equals to two train cars length flow time. When this timier is not rested and the acclimated tieaches the priested time that means the train left. Then an end cycle signals will switch the solenoid the other status and lowers the kerbs and switches the worn red and auditable signal off and a green tight come on for safe pass.

Two infrared switches (IR) are installed monitoring the gate passes traffic .whenever an object passes the road, this I/R will be switched at the entering and the other I/R at the leaving side. The signal of each IR is fed to software timer which has a presented time equals to suitable time for the truck to pass rested by the other side IR.

So it not rested that truck is stocked there, in this case a signal will switch a red light near the train arrive sensor to reduce the speed and stop before the gate will the obstacle is cleared then the system restarted the operation again.

#### **4. Conclusion**

Finally, we conclude that the number of accidents will be reduced by applying the above mentioned technology. Also this technology will be a new tool to use on the automated rail crossing and there are many aspects on which we can work for the future of next generation.

#### **Acknowledgement**

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#### **References**

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