AUTOMATIC TRAIN BARRIER

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INTRODUCTION

The railway system is the most commonly used transportation mode in India. It is also one of those modes of transport that faces a lot of challenges due to human errors such as level cross accidents, collisions, etc. A level cross, an intersection of a road and a railway line, requires human coordination, the lack of which leads to accidents. Level crosses are controlled by manually operated gates. In order to avoid the human errors that could occur during the operation of gates, the proposed paper introduces the concept of railway gate automation. Level crossings are managed by the gatekeeper and the gatekeeper is instructed me the means of telephone at most of the level cross from the control room. But the rate of manual error that could occur at these level crosses are high because they are unsafe to perform without actual knowledge about the train time table. Delay in the opening and closing of the gate could lead to railway accidents. The present work attempts to develop a system which automates gate operations (opening and closing) at the level cross using micro-controllers and switch gears.It also reads the unique id of train and transfer the data and location of the train to central server present in the nearest station which information could be upload to IRCTC.

The major challenge faced by the Indian railway system is the increasing accident rate at the level crosses. The existing system involves the manual gate operation by the gate keepers based on the signals received from the control room. The human errors such as delay in informing the gatekeeper about the arrival of the train, delay in the gate operation by the gate keeper, obstacle stuck in the level cross etc. leads to the increasing rate of accidents at the level cross. Thus the railway gate automation system aims to deal with two things. It reduces the total time taken for the gate operation at the level cross and also ensures the safety of the passengers at the level cross during when the train passes. The reduction in the direct human intervention during the gate operation in turn helps to reduce the collision and accidents at the level cross. Since the gate operations are automated based on the switch gears, the time for which the gate is closed is less. The project thus intends to develop an automatic railway gate control system which is reliable and secured than the existing manual system.

SYSTEM OVERVIEW

This railway gate automation system is developed to automate the process of opening and closing of gate at the railway level crosses. The system detects the arrival and the departure of train for the gate operation using switch gears..It also contains a RF -ID CARD READER which reads the unique id of the train. Switch gear,RF-ID READER and servo motors are programmed using Arduino micro-controller. The different types of equipments are used such as:

1.RF-ID TAG AND SENSOR : Sensor will read the unique id on the train through RF-ID tag on each train. It will send the information related to the train to the the arduino which passes the information to the central server.

2.SWITCH GEARS : The system contains two switch gears one to identify the arrival and one for the departure of trains.

3.ARDUINO : It takes input from the switch gears and RF-ID reader.It sends the information to other arduino which show the information related to the train using lcd screen.It also makes the barrier to open and close at the departure and arrival of the train respectively.

4.ETHERNET SHIELD : It is used to connect to internet and it also contains memory card which have all the data related to trains.

4.LCD SCREEN : It is used to print the name,arrival timings and PNR no of the train.

5.SERVO MOTORS : Used to open/close barriers.

6.LED LIGHTS : Three LEDs(YELLOW,RED,GREEN) are used to warn people about the arriving trains.Yellow to warn,Red to stop and Green to go.

SYSTEM ARCHITECTURE

As Train moves on the track,it reaches the first switch gear which sends a signal to arduino to close the barrier.We can see the yellow light is glowing to warn the people and just after few milli seconds red light glows and barriers are closed.In mid way RF-ID READER read the unique tag/id card on the train and sends this to arduino which sends it to the other arduino which reads the relevant information related to the train through ethernet shield which contains memory card.This information can be upload on the IRCTC(indian railway website) using ethernet shield .The second arduino shows the train's nformation on the LCD including it's estimated time to reach the next station.As train crosses the barrier it activates the second switch gear due to which arduino open the barrier.
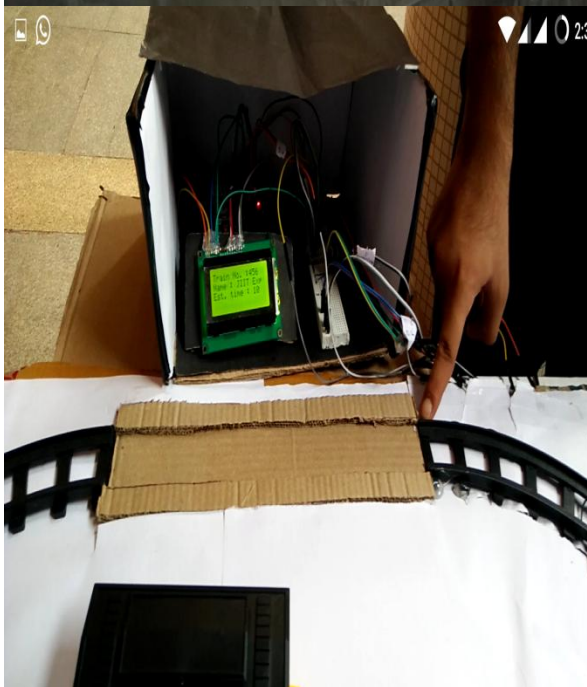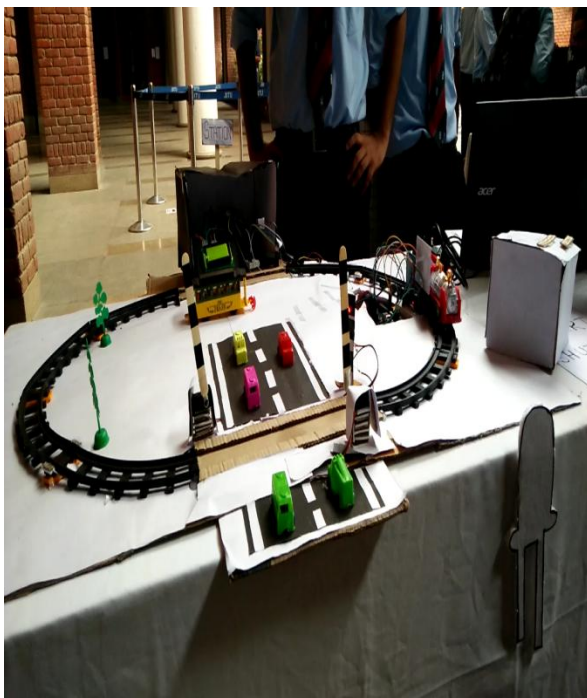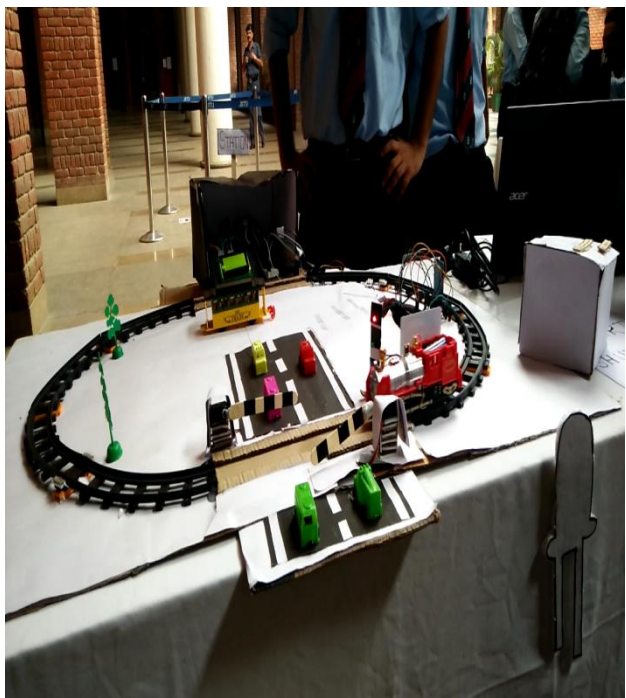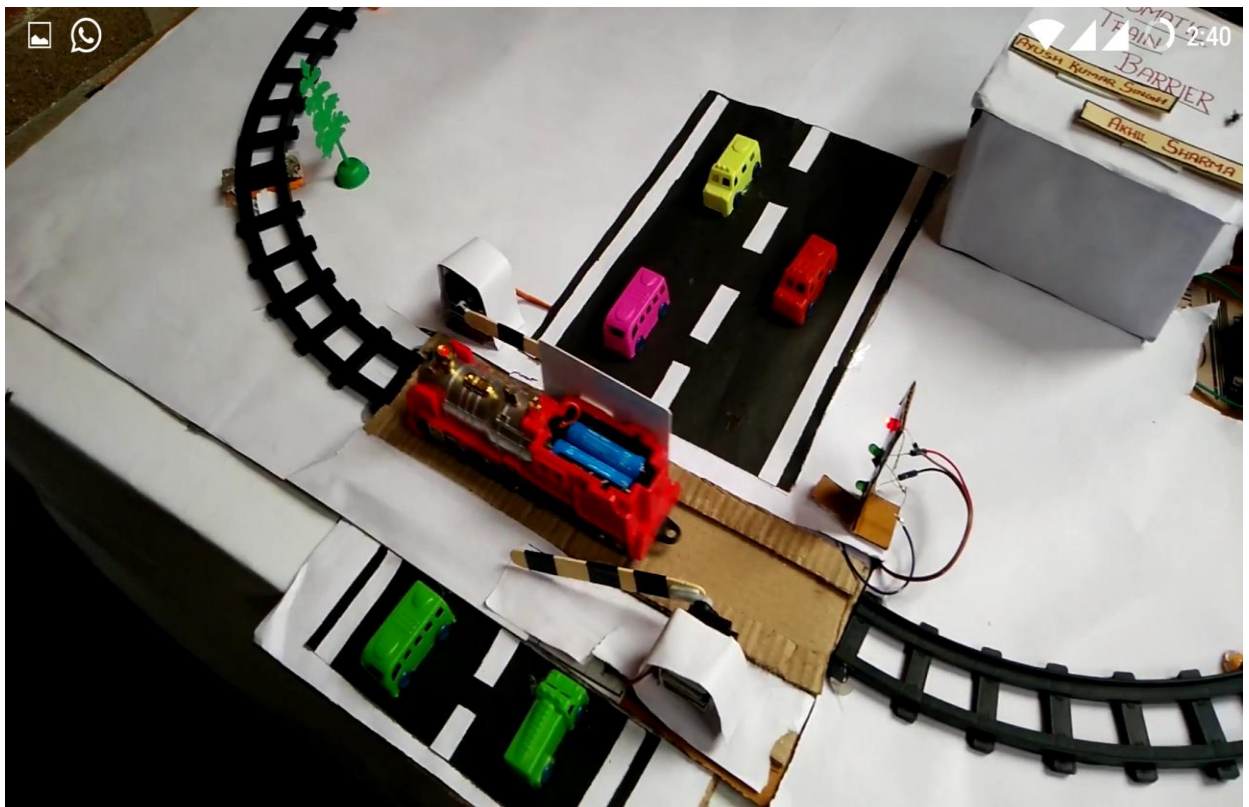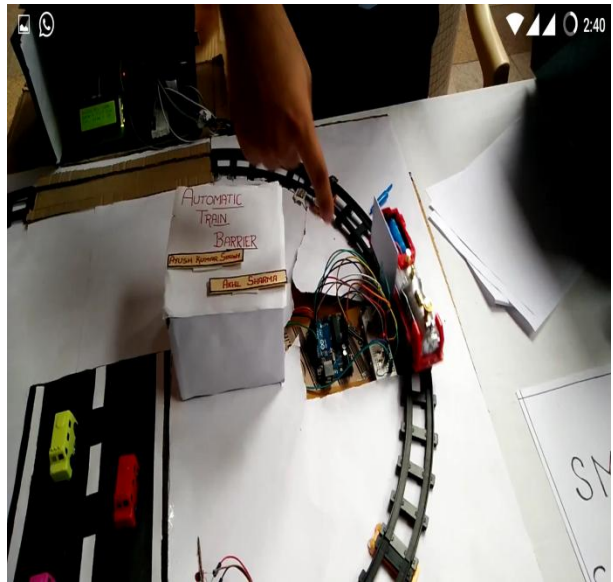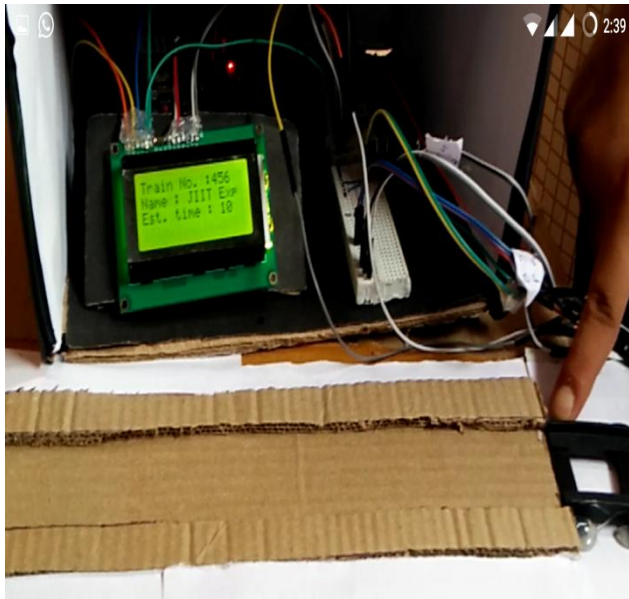
SCOPE AND FUTURE ASPECTS

Automatic railway gate control system is centered on the idea of reducing human involvement for closing and opening the railway gate which allows and prevents cars and humans from crossing railway tracks. The railway gate is a cause of many deaths and accidents. Hence, automating the gate can bring about a ring of surety to controlling the gates. Human may make errors or mistakes so automating this process will reduce the chances of gate failures. Automation of the closing and opening of the railway gate using the switch circuit reduces the accidents to a greater extend. The obstacle detection system can be implemented which will reduces the accidents which are usually caused when the railway line passes through the forest. Most of the times greater loss has been caused when animals cross the tracks.so placing IR sensors on the train can reduce these accidents. Another important limitation is that this project does indeed close and open the gate but it cannot control the crossing of cars and vehicles below the barriers. It only controls the gate. To combat this problem IR sensors can be used below the barriers so that they can detect vehicles below them and reduces accident.If barrier detects any vehicle than it can warn the train driver to slow down which could save a life. We are here using IR sensors but it is better to use load sensors. We have not used load sensors because it was not economically feasible. As a future scope of work, our system can be implemented in real time by fixing the current limitations using new technologies.