ABSTRACT-
In Railway stations normally used foot over bridges to go to the other platforms. Sometimes it is very difficult for the elderly persons or physically handicapped persons to use that bridge. The project designed here finds a solution to this problem. In this paper demonstrates two individual functions to go from one platform to the other easily in the railway stations. One among the two functions is the multi functional elevator and the other is the moving platform. Both of these are intended to minimize the efforts of crossing the railway track with luggage through the foot over bridges in the railway stations. Both the operations designed are independent and automated.

Key words — Mobile platform, Multifunctional elevator, Magnetic switches, Transmission.

INTRODUCTION
Generally an elevator is defined as Lifting device consisting of a platform or cage that is raised and lowered mechanically in a vertical shaft in order to move people from one floor to another in a building. The function of this kind of elevator is simple and we found these elevators in working everywhere, but here the concept is very different. In addition to the normal function, a special feature is incorporated in the system such that the machine carries the people in horizontal direction also, which is quite useful for many group of people to cross the railway track in the station. People like physically handicapped, old aged people and children can utilize this type of elevators. The other function demonstrated in the project is the moving platform. This is used for automatically closing/opening the mobile platform in between the train tracks. Normally the mobile platform connects (bridging) the two platform through which the passengers can walk on the platform to reach the next platform. When the train comes, sensors are placed on two sides of the track, if the train reaches one sensor, the mobile platform will automatically close and allows the train to go through the tracks and then when the train leaves the second sensor the mobile platform will automatically open bridging the two platforms. The microcontroller will sense the presence of trains by using infrared red sensors. So on sensing the train on one path, the controller will give signal to the DC motor to close the mobile platform automatically. The mobile platform has a red and green signal indication so that the pedestrians can know whether they can use the bridge or not. The signal automatically turns to red when train comes and becomes green when the train leaves the station. Block diagram of Multifunctional Elevator as shown in fig 1.
MULTIFUNCTIONAL ELEVATOR MECHANISM

Here the complete Mechanical Transmission Section is designed with three DC motors, the function of each motor differs from one to other. With the help of one motor mounted over the cab, the cab door mechanism is controlled such that the door can be opened or closed. Here sliding type of door is designed, Due to the lack of resources for the initial door mechanism such as proper rollers, the design of the door mechanism has changed to utilize materials that are available, the cabin and its sliding door mechanism constructed with MS (mild steel) plates, 1 mm thick MS plate is selected for the purpose, and it is cut in to the different sizes and welded in to a box shape. Proposed Elevator System & mobile platform shown in fig 2.
The DC motor used here is a 30-RPM, since the motor speed is very less the door is moved slowly. The movement of door is control by the rotation of the DC motor. The door movement is controlled with two limit switches, these limit switches are arranged over the cab, while opening the door, the motor rotates in forward direction and the door is moved towards left side, after moving certain distance, the door mechanism activates the limit switch by activating its lever. There by the door movement is stopped. Similarly while closing the door, and to stop the movement of the door after closing, another limit switch is arranged over the cab mechanism at its right side. The door, which moves in between the sliding channels arranged inside the box, is attached to the plastic strip (plastic door guide). Upon reaching the desired level, to make the elevator door open, signal will be given for the motor to rotate. When the motor shaft rotates, the plastic strip with the trigger bar will move until it touches latch of the micro-switch, this will then create an input to stop the motor. After staying open for a few seconds, the motor will be controlled to move again in the other direction. This motion will be the closing and opening door movement. A program will be added to the main program for the motion of the elevator door. For more clarity about the toothed wheel that is coupled directly to the DC motor shaft, DC motor arrangement over the cab, the plastic strip alignment with wheel. The limit switch is having long lever, like this six limit switches are used, and they are arranged at six different positions of the mechanical structure to control the movement of mechanical transmission section. The motion of the motor in the form mechanical movement, if it touches to the lever, than the switch is activated and generates a logic low signal for the microcontroller. Based on this signals produced by the all six limit switches, the microcontroller controls the mechanical movements of entire machine. During vertical movement of the elevator, one limit switch is arranged at top side of the mechanical structure, while the elevator traveling in vertical direction towards up, this switch is controlling the movement of elevator. Means, whenever the mechanism lifts the elevator up to certain extent, this switch is operated, there by the elevator stops at certain fixed height and travels in horizontal direction to reach other end of the road. Likewise with the help of these limit switches/lever switches, the horizontal and vertical movements of the elevator are controlled effectively. With the help of a second motor mounted at top side of the mechanism, the elevator is lifted up and pulled down through the vertical mechanical transmission section designed with sliding channels. Here the motor is mounted over a small metal plate and this plate along with the motor is coupled to the sliding channels. The geared wheel coupled to the motor shaft is aligned with a chain firmly, now this chain is mounted to the mechanical structure in vertical direction. Depending up on the movement of the motor rotation, the motor itself moves in up down directions along with chain. Here elevator is also fixed with the sliding channels, thereby it also moves up and down along with the motor. The solar panel that drives the machine and charges the battery is not shown in the picture. The third DC motor shown at the top left side of the mechanism is used to drive the elevator in horizontal direction. This motor is also mounted over the vertical moving section, which moves along with another chain system mounted over the structure in horizontal direction.

Moving Platform Mechanism

The platform moving mechanism is operated by the use of a DC motor for the present work. However in actual application heavy duty motors may be employed depending on other considerations such as load etc. The DC Motor used in this work to drive the platform is a reduction gearbox of 30-rpm and this can be varied depending on the rate of closing/opening the
platform. A small moving platform mechanism with sliding channels is coupled to the motor shaft to simulate the platform opening or closing mechanism depending on the presence of the train.

**Magnetic switches**
The magnetic switches used are assembled in a glass container, when the heavy magnet is brought near to this magnetic switch; the contact of the switch gets closed automatically due to the magnetism. In this work two such magnetic switches are used and they are installed at two different reference points of the railway station. Presently, in the prototype module, these switches are arranged near the track. But in practical these switches can be arranged under the ground near original railway track. The train, which is equipped with a heavy magnet below the chassis passes over the magnetic switch, can cause a sign that the train is reaching the reference point (station). In the work for the demonstration purpose, an aluminum channel is used and it is laid over a wooden plank to simulate the railway track. Similarly to simulate the train, a small metallic trolley is constructed with four wheels and a small magnet is arranged over the trolley. This trolley is driven through a DC motor and when the trolley reaches near the magnetic switch, this switch actuates and produces a logic low signal to the controller. This signal from the magnetic switch is fed to the microcontroller for taking the necessary action. On receipt of a signal from the magnetic switch, the microcontroller operates the DC motor by which the motor rotates in clockwise to simulate that the platform is closed i.e., bridging between the platforms is removed. The same way when the train leaves the station from the other reference point, the other magnetic switch will provide another signal to the controller, by which the platform will be opened by rotation the DC motor in the opposite direction i.e., bridging the platforms. Now coming to the magnetic switches, different shapes and sizes are available in the market. Since technologies of the product have more and more advance, the products need comply with a requirement for more safe, convenient and low cost. The magnetic switches are extremely compact, simple and are easy to install on any small space. These switches are not affected by electrical interference. They can withstand to chemicals, high temperatures and pressures. When the magnetic field of permanent magnet inside the float is moved into to the proximity of the reed switch inside the stationary stem, the reed switch "snaps" the contact together and closes the electrical circuit. When the magnetic field is removed away from the switch the contact of the switch does not touch and the circuit will be in open condition. The following is the diagram of magnetic switch.

**Mechanical transmission section**
The mechanical system is considered as motion converter, this can be created by implementing electro-mechanical techniques. The concept is to transform the motion from one form to some other required form by using suitable mechanical and electrical devices. In this work the technique of transform the rotational motion into linear motion is implemented. For this purpose a DC motor is used to create the motion for the platform in the horizontal direction over the railway track as well as in the multi functional elevator. The motor is constructed with reduction gear mechanism and it is built in with the motor internally. As the machine is designed as prototype module, lowest rating motor is used to drive the mechanism. The advantage of selecting reduction gear mechanism motor is that a small motor can drive heavy loads. As the
motor is purchased from local market, ratings’ regarding torque is not mentioned. Only speed (RPM) and the operating voltage are specified. As per this data the motor is designed to operate at 12V DC and the motor speed is 30 RPM. The motor driving capacity is tested practically and in our test we came to know that the motor can drive an independent load of maximum 3 Kg. There by according to this driving capacity, one small mechanical structure is designed for the demo purpose. To drive the moving platform mechanism that bridges the two platforms and for the elevator mechanism, a high torque, high precise movement DC motors are used such that the clock wise rotation of the DC motor moves in one direction and anti clockwise rotation of DC motor will move in the other direction. The DC motor driving is done with a drive circuit using relays for multi functional mechanism and through H – Bridge for the moving platform mechanism. Moving platform mechanism as shown in fig 3.

![Fig.3.Moving platform mechanism](image)

The limit switches are used as input signals for the DC motor driving circuits i.e., relay or H-Bridge that controls the movement or the direction of the motor. The motion is created by rack-and-pinion method by coupling a pinion/toothed pulley directly to the motor shaft. Here with the help of the DC motor the platform moves between two reference points in horizontal direction. The entire mechanism is arranged over a single structure and horizontal movement is intended to move the platform in a straight line. The reference points are identified through limit switches.

CONCLUSIONS

The goal was to develop an arrangement of mobile platforms and multifunctional elevators in the railway stations to help the passengers to travel from one platform to another easily and quickly. In this paper alot of importance was given to mechanical structure and to design and develop a good looking robust structure. For demonstration purpose a prototype model is constructed and results are found to be satisfactory. The performance of the machine is purely depends on the software for performing tasks depending on the inputs defined in the controller. The technology utilized here is for developing the prototype module only; it has to be enhanced to develop it in to a real working system.
REFERENCES