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Automated Design of Ramp Doors for Trains Using Solar Panels

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ABSTRACT: Railroad transportation is significant method of transportation of individuals and products in India. They give the least expensive and most advantageous method of traveler transport for significant distance and rural traffic. Safety is the main part of rail line and other public vehicle. The fast development of India's metropolitan populace has put gigantic strains on all vehicle frameworks. Most transport and train administrations are stuffed, inconsistent, moderate, awkward ungraceful, and risky. Advancement of a keen transportation framework for Indian Railways will build its productivity and security. The utilization of RITS engineering supports organized turn of events and incorporation of shrewd transportation frameworks (ITS) that lead to amplification of advantages by limiting redundancies and amplifying capabilities. Considering the security of the travelers and how the old, youngsters and the crippled think that its awkward to board the train with their gear, the possibility of a drawbridge entryway for trains to the train stage once the train has halted is introduced in this work.

I. INTRODUCTION

Indian Railways deals with the third-biggest railroad network on the planet by size, with a course length of 40,576 km (25,213 mi). 23 million travelers travel via trains in India consistently. India runs 11,000 trains ordinarily, of which 7,000 are traveler trains. India has 108,706km of rail route tracks. 23 million travelers travel via trains in India consistently. The quantity of individuals utilizing rail transportation has been consistently rising. Subsequently, this has likewise prompted an expansion in the quantity of traveler related mishaps that are happening inside rail line stations. It was discovered that individuals in their 50s to 70s were generally powerless to rail line mishaps contrasted with other age gatherings. Nonetheless, paying little heed to this expansion in the quantity of rail travelers, security measures guaranteeing traveler wellbeing are as yet needing a lot of progress. With an end goal to forestall such mishaps, a significant part of the rail activity framework is currently mechanized. In the proposed project mechanized slope entryways are given transports which is the answer for the vast majority of the setbacks caused at rail route station.

II. OBJECTIVE OF THE PROJECT

This work will be able to

- Avoid accidents while boarding the train.
- Avoid unnecessary entry and exit of the passengers in a moving train.
- Provide a ramp to carry the passenger luggage very comfortably which also helps the physically challenged passengers to board the train.
- To bring innovation in the field of transportation technology.



III. METHODOLOGY

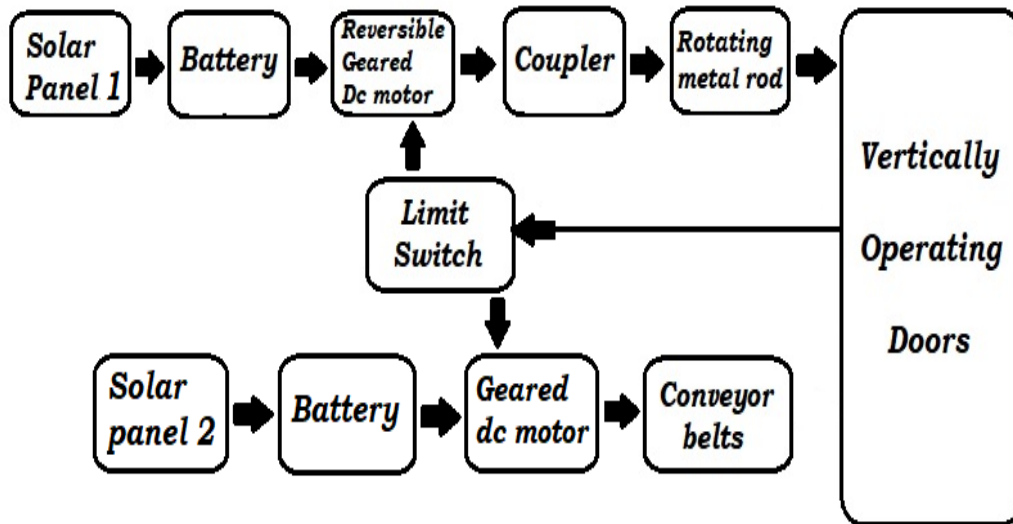


Figure A: Block diagram of the proposed prototype

The proposed project is to design an automatic railway door control system which can be implemented easily in trains. A vertically opening ramp type of door system provided with conveyor belts is design to meet the above objectives. Among the four doors available in the compartment, two doors are provided for entry and other two for exit purpose only to avoid accidents. The power required to operate the doors is obtained from the solar energy installed on the outside face of the doors.

Mild steel is used for the fabrication of the door system. 12V/5amps reversible geared dc motor is used for the vertical movement of the doors. Since the doors should operate in both the directions reversible dc motor. The doors are coupled to a mild steel rod for simultaneous operation which is connected to the geared dc motor through mechanical coupler. The doors are provided with conveyor belts for easy movement of goods and passengers. 12V/5amps geared dc motors are used for the movement of conveyor belts and they will be rotating in opposite direction to each other since one door is provided for entry and other door is for exit. In the proposed prototype the conveyors are able to carry a weight up to 20kg. Each door weighs about 9.2kg therefore the load on the motor is approximately 20kg, therefore 12v/5 amps geared dc motor is used since it can take the load up to 20-22kg. Limit switches connected to the doors to stop the movement of the door when it reaches the platform surface and for safe operation of the door. The power supply for the operation of the prototype is provide taken from a 12v-7ah lead acid battery which is connected to a 12v 10w solar panel.

In the proposed prototype 12v/10w solar panel charges the lead acid battery and the power supply from the battery is given the geared dc motor, when the motor rotates the mid steel rod coupled to it starts rotating and thereby the door starts opening, the limit switches stops the motion of the motor when the door reaches the surface of the floor and the conveyor belts also starts rotating. When the polarity at the battery is changed the door closes and stops as it reaches the compartment. Thereby, the output of the prototype satisfies the proposed objective.



IV. MODELING AND ANALYSIS



Figure 1: Completely opened ramp door.



Figure 2: Closing of door

Dimensions of the prototype:

- Door :
Width: 18 inches
Weight: 9.2 kg

- Compartment :
Length: 60 inches
Width: 36 inches
Height: 42 inches



V. RESULTS AND DISCUSSION

Prototype capabilities:

- Each conveyor in the door has the capacity to carry an object up to 20kg.
- The reversible geared motor coupled to the door can easily operate with the net weight of both the door is 18.4kg.
- The door takes approx. 8-10 seconds to open onto the platform.

ADVANTAGES

- Avoids the passengers who get on and off the moving trains. The main for accidents in the railway system is the urgency of passengers and lack of discipline among people.
- The proposed innovation in the system brings disciplined in the passengers provided separate entry and exit doors which avoids major accidents.
- Drawbridge doors are provided with conveyors which makes it easy for the disabled, old aged people and women to board the train with their luggage.
- Reduces rushing of people.
- Reduces casualties like standing near the door when the train moving and unwanted entry and exit of passengers
- Reduces human effort since doors can be operated by a single person through an electric switch
- Utilization of renewable energy, since solar panels are used.

VI. FUTURE SCOPE

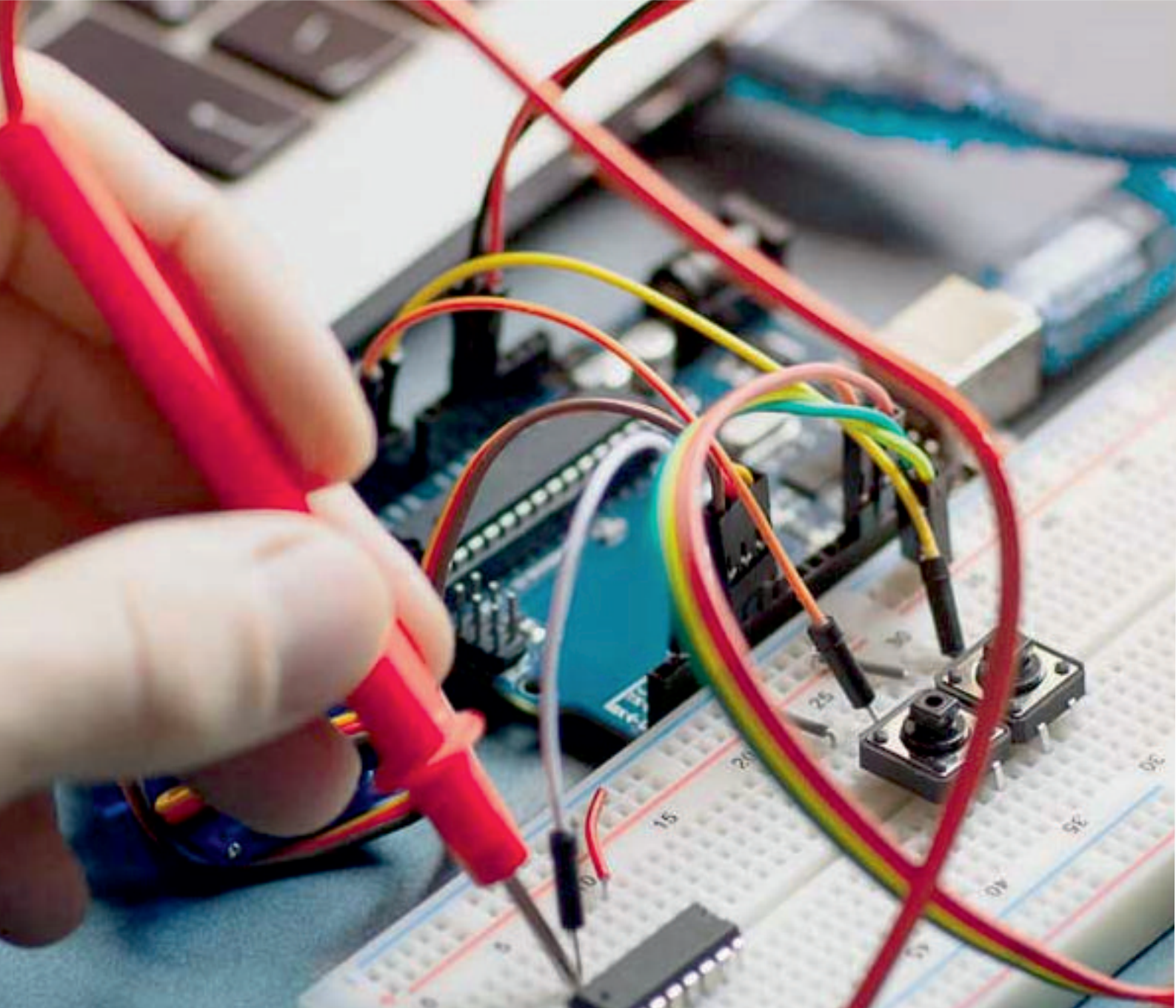
- Regularly, instances of mishaps like falling of travelers during entraining/detraining because of the flat just as upward holes among stage and mentor floor of the trains are accounted for. Because of space compels according to Diagram-1D and Diagram-2 of Indian Railway Schedule of Dimensions (IRSOD) followed for Indian Railways mentor plan, and because of mentor conduct in powerful conditions, the flat hole among stage and mentor floor can't be upset, however overhauling of complete entraining/detraining course of action incorporating entryway with fixing game plan, strides and entryway handle viable with stage might be worked out.
- On utilization of the proposed model on a standard public trains a large portion of the issues and mishaps can be diminished. Utilization of environmentally friendly power energy in the framework is the principle angle. In the proposed model limited scope sunlight based boards and battery is utilized. Types of gear of higher limit and determinations can be utilized for quicker charging and exact outcomes. Since rail line is the most utilized method of transportation in India and the Department of Indian Railways is a huge area of the Indian government and the variety in the topographical locale and their workers it is difficult to carry out the proposed thought. However, in a large portion of the trains and area the proposed thought of Automatic Ramp Doors would get a more noteworthy development the field of transportation innovation in India and traveler wellbeing.

VII. CONCLUSION

As portrayed before in the paper, the proposed thought of the task gets an advancement of innovation the field of railroad transportation. There will be no human blunders or need of actual exertion by rail line representatives. Brings discipline among workers and saves lives through more secure mechanical advancement. Significant goal of making it simple for the old matured travelers to board the train is being tackled. With the assistance of the innovation and electronic devices accessible in market the thought could be brought into the real world. This task is created to profit the general public.

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