

Solar Based Running Zebra Crossing System

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Abstract: *An automatic road crossing system is crucial because in many developing and poor nations, the regulations and customs around crossing the street are not very strict. Additionally, the level of risk that is assumed around us on a daily basis only strengthens the case for an automatic zebra crossing system. This paper offers a straightforward, low-cost solution to this issue based on an Arduino-UNO-based system. Urban regions with high traffic volumes render pedestrian crossings dangerous. This essay seeks to prevent accidents from occurring when pedestrians are crossing at traffic lights. Because drivers disregard the signals, there are more collisions with pedestrians. The automatic barriers for the zebra crossing proposed in the study prevent these accidents. These barriers automatically rise when people are crossing and lower when cars are moving. The device can accurately measure the parameters required of an Automated Zebra Crossing system and is completely autonomous.*

Keywords: Arduino-UNO.

I. INTRODUCTION

Road transport is essential for mobility of people and goods as well as it contribute for India's development. This is a brand-new idea for reducing traffic accidents and vehicle speed. With the aid of this model, we demonstrate the idea of employing speed limiters to prevent accidents. The idea is incredibly creative and practical for the demands of today's fast-paced life. An automated road crossing system is crucial in many developing and underdeveloped nations where the rules and customs for crossing roads are not particularly strict. One of the pedestrian safety measures intended to lower pedestrian crashes is a zebra crossing or pedestrian crossing. A zebra crossing is a location on a road where people on foot can cross it. Crosswalks, also known as pedestrian or zebra crossings, are common at crossroads and over lengthy stretches of road. Markings on the road, usually white stripes, serve as indicators of marked crossings.

II. LITERATURE REVIEW

[1] Title: Automatic Barrier Control in the Zebra crossing of Roads for Pedestrian Safety, 2021

Authors: S J Suji Prasad, P Yugananth, R Kumaravelan

The high volume of traffic on the roads makes pedestrian crossings unsafe in urban areas. The goal of this paper is to stop accidents from happening when pedestrians cross traffic signals. The unethical behavior of drivers who fail to signal causes pedestrian collisions. The proposed paper for preventing these mishaps by presenting programmed boundaries for the zebra crossing. During the pedestrian crossing, these barricades automatically raise and lower themselves, allowing for vehicle traffic. The camera also keeps an eye on people who ignore traffic signals.

[2] Title: An Automated Zebra Crossing using Arduino-UNO, 2018

Authors: A M Muntasir Rahman, Md. Rakib Hossain, Md. Quamar Mehdi

An automated road crossing system is crucial in many developing and underdeveloped nations where the rules and customs for crossing roads are not particularly strict. In addition, the volume of risk that is taken every day all around us only strengthens the case for an automated zebra crossing system. Using a straightforward system based on Arduino-UNO, this paper proposes a simple, cost-effective solution to this issue. The parameters expected of an Automated Zebra Crossing system can be accurately measured by the system, which is completely autonomous. Ultrasonic sensors

were used to measure the system's required parameters. The system's experiments show that it can be outwitted one out of every 200 times, which is an efficiency rate close to 99.5%.

[3] Title: Implementation of an Automatic Pedestrians Road Crossing Detection System Based on Recent Microcontroller System, June 2020

Authors: Y. Murali, R.Bhuvana Sree, A. Bindu Madhavi, B. Geervani, 5G. Hari Priya, 6N. Gnaneshwar

the study paper that was successfully produced was able to better comprehend the controller and appreciate its power. This device detects pedestrian crossings in a variety of settings and lighting conditions. It can detect dirty and damaged crossings automatically in the interim, making it easier to monitor and maintain traffic facilities to prevent potential traffic safety issues and protect people and property. With the aid of the controller's decision-making abilities, they are able to design anything. Since this article is an embedded project, it aided in our understanding of numerous controller principles. Based on cutting-edge technology known as embedded development, which is a niche sector in today's market and has a very promising future. The item has the potential to generate revenue through market sale.

[4] Title: A zebra crossing could be the future of our roads January 19, 2022

Authors: Patricia Licerias

Smart street lighting, and smart crosswalks can improve road safety and promote accessibility for those with vision and mobility challenges. True smart pedestrian crossings are not officially defined. However, this paper broadly define it as any crossing that makes use of technology to raise the level of safety for both walkers and vehicles, perhaps enhancing urban traffic. The utilisation of components including auditory and/or visual alerts based on lights, IoT connectivity to municipal services, and infrastructure to vehicle communications can all be used in smart pedestrian crossings. Incorporating connected stoplights smart street lighting, and smart crosswalks can improve road safety and promote accessibility for those with vision and mobility challenges.

[5] Title: Automatic uplifting of pedestrian crossing platform using congestion monitoring, 23 September 2021

Author: Madhuri P S; Soumya K J; S Vaishnavi; Sreena V G

One of the primary problems faced globally is the amount of traffic on the roads and the number of pedestrian accidents. The risk when crossing or walking on roads in urban and rural regions with significant traffic is a major factor in these accidents. An innovative concept called "Automatic raising of pedestrian crossing platforms utilizing traffic congestion monitoring" is put forth in order to prevent such situations. An IR (Infrared) sensor module is used to continuously monitor pedestrian and traffic congestion. The traffic light turns red for the automobiles when there is a higher concentration of pedestrians, allowing the pedestrian to cross on an elevated platform.

The suggested device includes a motorized platform that is positioned on the zebra crossing line and automatically rises when an infrared sensor detects and counts the densely packed pedestrians at the signal point. This technique guarantees pedestrian crossing safety and prevents drivers from flouting the law, which could cause accidents. In order to avoid any delays in reaching the destination, this development also incorporates technology that enables emergency vehicles, such as ambulances, to cross the signal point even while the traffic light is red for vehicles.

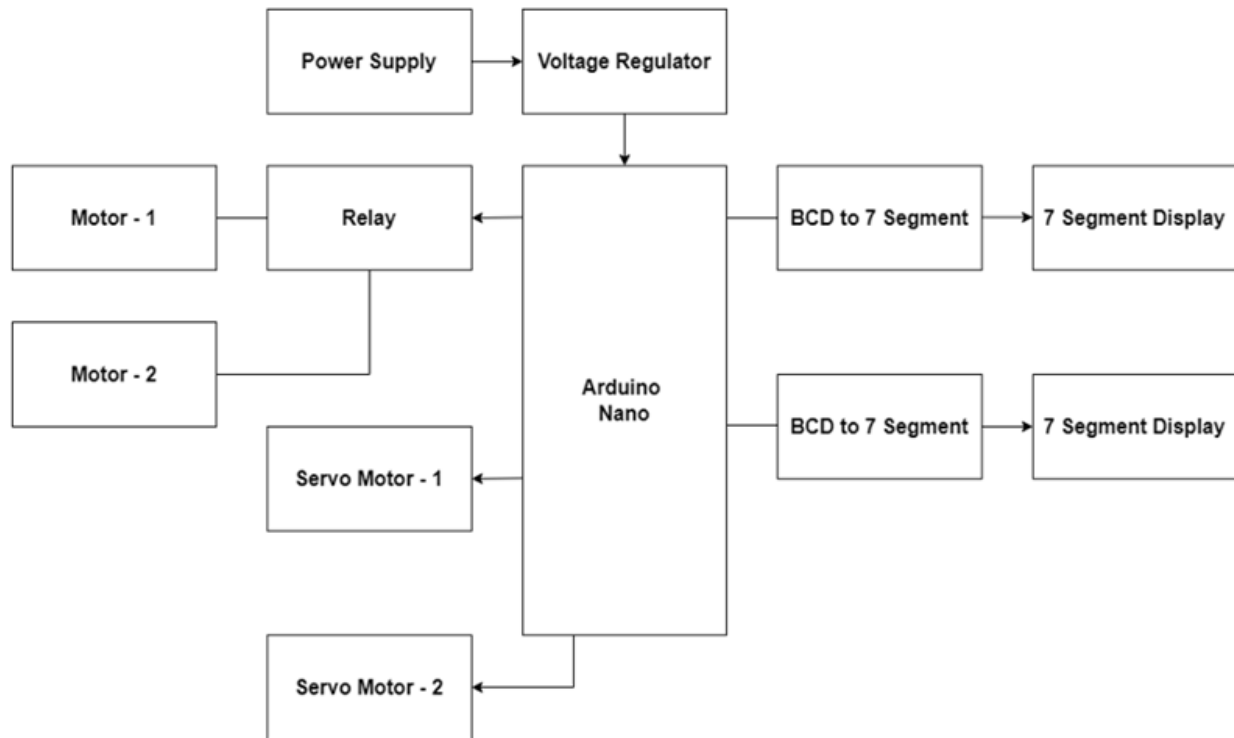
III. METHODOLOGY

Once the Microcontroller detects the presence of a person, it acknowledges the presence with an LED light and a speaker.

When the road signal turns RED (wait 5 s) the pedestrian side turns GREEN (with a continuous sound indicating it's safe to cross), and a countdown is initiated, which is displayed across a DUAL 7-seg display. If any junction displays a green led, the remaining junctions display a red led; when this red led glows, the strips automatically open, allowing pedestrians to easily cross the road; when this process is complete, the strips automatically close simultaneously. This process is repeated for additional junctions. When the sound of emergency vehicle is detected then speaker alert (pedestrians and vehicles) and escalator stops working and barriers go down. This whole process is kept inside a loop where the sensor is reset after every complete execution.

Prior to implementation in a real life scenario, the proposed system had to be properly scaled in order for the system to give out the perfect output in a controlled environment. For the prototype that has been developed for the showcasing of the capabilities and potential of the system, a miniature model has been created.

IV. BLOCK DIAGRAM



V. WORK DONE

A solar-based running zebra crossing is a type of pedestrian crossing that uses solar panels to power its operation. It is designed to be more visible to drivers and pedestrians alike, which can help increase safety in busy areas. The running zebra crossing is controlled by an Arduino UNO microcontroller, which sends signals to a servo motor that controls the movement of the crossing. Here is how the system works:

1. Solar Panels: The system is powered by solar panels, which convert sunlight into electrical energy.
2. Battery: The electrical energy is stored in a rechargeable battery, which can be used to power the system when there is not enough sunlight.
3. Arduino UNO: The Arduino UNO is a microcontroller board that is used to control the system. It is programmed to detect when a pedestrian wants to cross the road, and then to activate the servo motor.
4. Servo Motor: The servo motor is used to move the zebra crossing from one side of the road to the other. It is controlled by the Arduino UNO, which sends signals to the motor to move it in the desired direction.
5. Sensors: The system uses sensors to detect the presence of pedestrians waiting to cross the road. These sensors can be either infrared or ultrasonic, and are placed at each end of the crossing.
6. LED lights: The system also includes LED lights that flash to alert drivers when the crossing is in use. These lights are powered by the solar panels and are designed to be highly visible even in bright daylight.

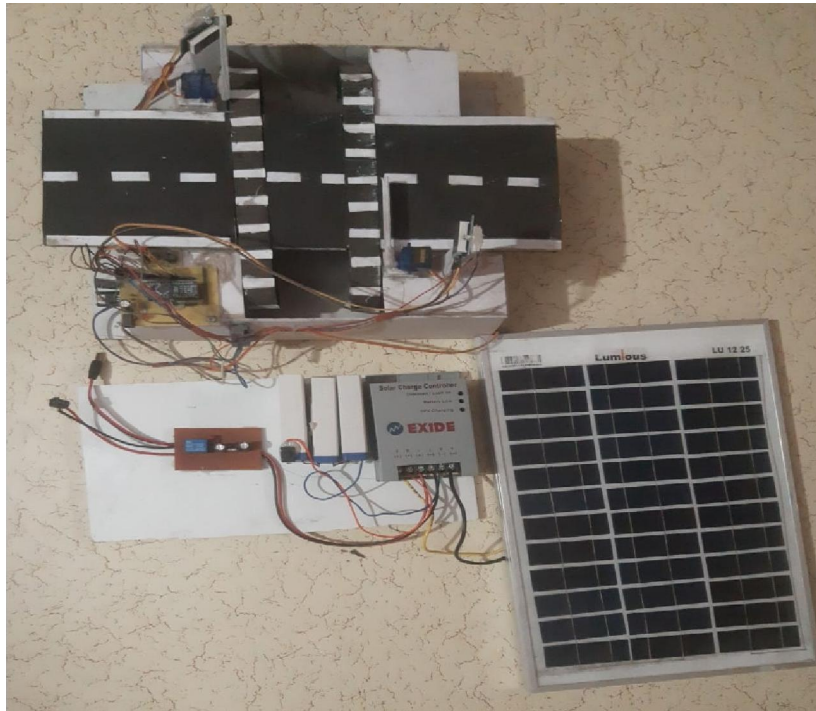
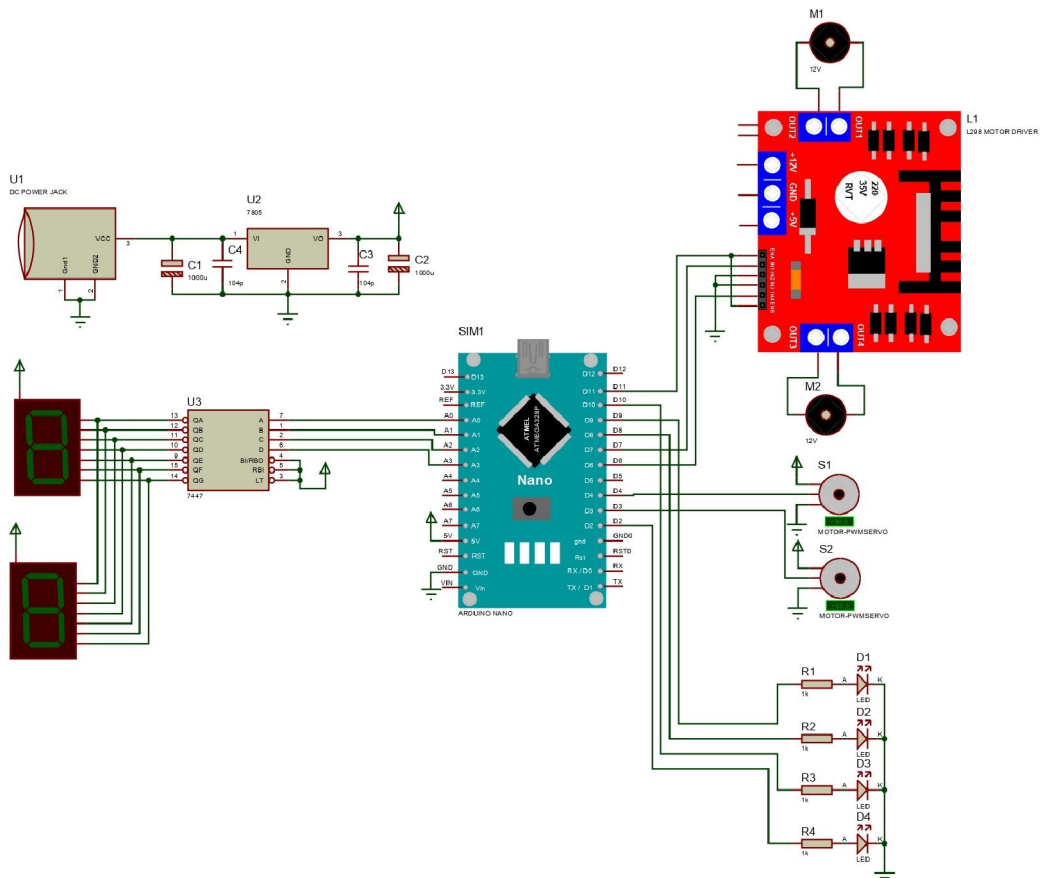


Figure : Circuit Diagram of Zebra Crossing System



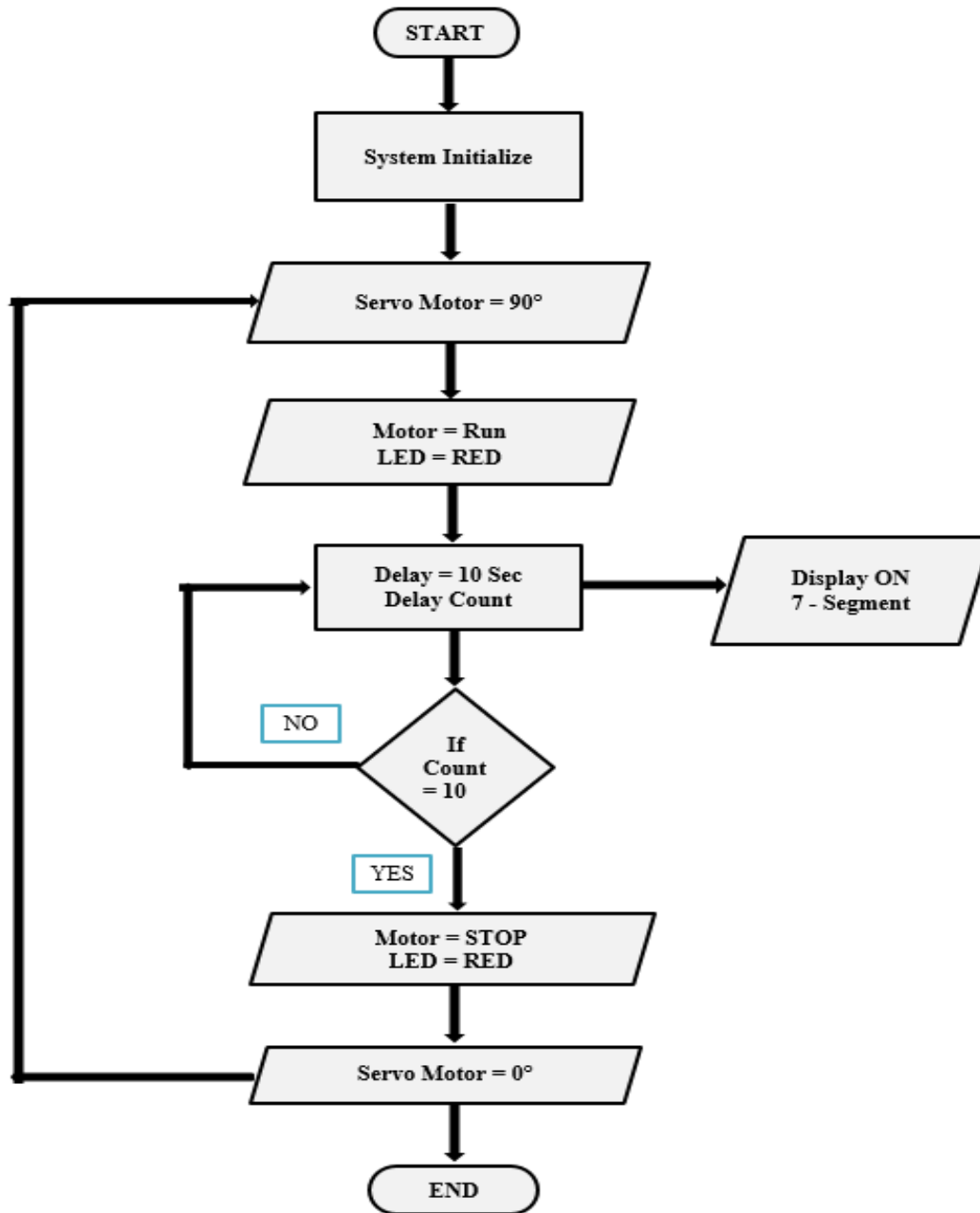


Figure : Flow Chart of Zebra Crossing System

VI. CONCLUSION

- In accordance to the project report at hand, all the objectives highlighted earlier have been accomplished. The choice of modifying a zebra crossing as the subject to work on has been fulfilling since it has been an issue under full expansion with a promising future.
- This technology is in a constant expansion which covers the security and safety of every road user and grand users' comfort.
- Since the goals established to realise the study's main notion were accomplished. The system is workable since the results of testing every component that interfaces with the Arduino Uno concur with the idea.

- The prototype detailed in this study shields pedestrians from collisions in locations with high traffic volumes. Also the Cops will be able to identify defaulters breaking the rules and regulations, with ease if they use this clever system. When putting anything together on a huge scale, this is more practical and affordable.
- With the proposed barrier model, pedestrian collisions caused by automobiles that disregard traffic signals can be prevented. By adding automatic barriers to zebra crossings that will raise to accommodate pedestrians and lower to accommodate automobiles.
- The system has been successfully designed and implemented, with results that are satisfactory when compared to the theoretical goals. When the data were analysed, a few departures from the real expectation were discovered.
- However, the intelligent zebra crossing has been a success for the drivers because it has increased pedestrian confidence and safety when utilizing the designated crossings.

VI. FUTURE SCOPE

- Based on a cutting-edge technology called embedded development, which is a niche sector today and has a very promising future.
- The created product is ready for use and has the potential to generate revenue through market sale.
- The Automatic Pedestrians Road Crossing Detection is still far from ideal, but we think we have set the stage for it to get better beyond our vision.
- Decreased the number of crossing-roads accidents.
- In the future, everyone ought to automatically adhere to the traffic rules.
- LED-based designs can be turned on and off at will and can be managed dynamically and remotely.
- Despite their recent development, there are already a number of possible advantages to using smart crosswalks, depending on their level of complexity:
- The capacity to effectively regulate urban traffic, decreasing traffic.
- Decreased number of accidents due to their better visibility.
- They can be remotely and dynamically monitored .
- They can adapt to various sorts of streets and traffic circumstances.

VII. SOCIETAL RELEVANCE

Zebra crossings are an essential part of urban infrastructure and have significant societal relevance. They are marked pedestrian crossings with black and white stripes, which help people to cross the road safely by alerting drivers to the presence of pedestrians. Here are some of the ways in which zebra crossings are relevant to society:

1. **Pedestrian safety:** Zebra crossings are designed to prioritize pedestrian safety, by alerting drivers to the presence of people crossing the road. They encourage drivers to slow down and stop, making it easier for pedestrians to cross the road safely.
2. **Traffic management:** Zebra crossings also help to manage traffic flow, by providing designated areas for pedestrians to cross the road. This helps to reduce congestion and improve traffic flow in busy areas.
3. **Accessibility:** Zebra crossings are an essential part of making cities more accessible for people with disabilities. They provide a level surface for wheelchair users, and the high contrast markings make them easier to see for people with visual impairments.
4. **Education:** Zebra crossings can also be used as an educational tool, teaching children and adults about road safety and pedestrian rights. They help to raise awareness about the importance of pedestrian safety, and encourage people to use designated crossings when crossing the road.

Overall, zebra crossings are an important part of urban infrastructure, promoting pedestrian safety, traffic management, accessibility, and education.

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