Smart Zebra Crossing

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Abstract:- The smart zebra crossing is an essential technology for enhancing pedestrian safety on busy roads. This project proposes a smart zebra crossing system that utilizes DC and Servo motors, an Arduino Uno microcontroller, and ICs without the use of sensors. The system is designed to control the traffic lights and provide a safe and efficient crossing experience for pedestrians. The system uses a DC motor to control the traffic light for vehicles and a servo motor to control the traffic light for pedestrians. The Arduino Uno microcontroller and ICs are used to control the motors' movements and timings. The traffic lights' timing is programmed to ensure that pedestrians have enough time to cross safely, while vehicles are stopped at the crossing. This project presents a smart zebra crossing system that utilizes DC and Servo motors, an Arduino Uno microcontroller, and ICs to control the traffic lights without the use of sensors. The system provides a safe and efficient crossing experience for pedestrians, reducing the risk of accidents on busy roads.

Keywords:- Arduino Uno, Dc Motor, Servo Motor, Pedestrian Crossing.

I. INTRODUCTION

Zebra crossings are essential in providing safe passage for pedestrians across busy roads. However, conventional zebra crossings have some limitations, including a lack of control over vehicle movement and pedestrian safety. To overcome these limitations, a smart zebra crossing system is proposed in this project. The proposed system aims to enhance pedestrian safety by controlling the movement of vehicles on the road and providing a safe crossing for pedestrians. The system uses a DC motor and servo motor, controlled by an Arduino Uno microcontroller, to create a barrier-free crossing for pedestrians. The system relies on the microcontroller to control the motors based on the traffic conditions. The DC motor is used to moving walkway. While the servo motor is used to rotate the barriers warnings alert the drivers. The proposed system is designed to be cost-effective, simple to implement, and efficient in ensuring pedestrian safety. The system can be easily integrated into existing zebra crossing infrastructure, making it an attractive solution for improving pedestrian safety in high traffic areas.

II. LITRATURE SURVEY

Zebra crossing is an essential part of road infrastructure that provides a safe passage for pedestrians. However, due to the increasing number of vehicles on roads, accidents at zebra crossings have become a common occurrence. To improve pedestrian safety, several smart zebra crossing systems have been proposed in the past. In recent years, several studies have proposed the use of sensors to detect the pedestrian's presence and control the traffic lights. However, these systems are costly and require frequent maintenance. In this project, we propose a smart zebra crossing system that does not use sensors and is cost-effective. The proposed system uses a combination of DC motor, servo motor, Arduino Uno, and IC to detect the pedestrian's presence and control the traffic lights. The Arduino Uno and IC are used to control Dc motor and servo motor. Dc motors have been widely used in different application, including transportation and robotics. In this proposed system, the Dc motor is used to walkway, providing a safe and easy way for pedestrians to cross the street. The use of a Moving walkway has several advantages, including reducing the waiting time for pedestrians, improving pedestrian experience, and reducing congestion. Servo Motor is widely used in different applications, including robotics, automation, and control systems. In this proposed system, the Servo Motor is used to rotate the barriers and traffic lights to indicate to drivers when to stop and when to proceed. The entire system is Maintain. The proposed system has several advantages over the existing systems. Firstly, it is cost-effective and easy to implement. Secondly, it does not require frequent maintenance. Finally, it provides an efficient solution for pedestrian safety. Smart zebra crossing system is an efficient and cost-effective solution for improvingpedestrian safety. The system can be easily implemented and provides a safe passage for pedestrian's by controlling the traffic lights based on their presence.

III. METHODOLOGY

Concepts like "Smart Zebra crossings" might aim to optimize traffic flow, reduce congestion, and minimize environmental impact. The project is used to design a system that enhances the safety of pedestrians and assists them in crossing the road. In this project we used many components like as –Arduino Uno, DC Motor, Servo Motor, and IC etc.

Set up the Arduino Uno on a breadboard and connect the power and ground pins accordingly. Connect the servo motor to the breadboard and Arduino. The servo motor will control the barrier arm to stop vehicles during pedestrian crossing. Connect the DC motor to the breadboard and Arduino. This motor will be used to provide a moving walkway for pedestrians.

First Install the Arduino IDE on your computer if you haven't it in the system already and the Arduino board can be connected to the computer system using USB cable. Write the code that will read input from the ultrasonic sensor and decide whether to stop the vehicles or activate the moving walkway.

Implement the logic to move the servo motor to block the vehicles when a pedestrian wants to cross the road.

Program the DC motor to activate the moving walkway for a specific duration when a pedestrian request is detected.

Control the LEDs to indicate to pedestrians when it's safe to cross and when the moving walkway is activated.

Design and build the physical structure of the zebra crossing, including the barrier arm and moving walkway.

Make sure the servo motor is mounted in a way that allows the barrier arm to be raised and lowered to stop vehicles.

The DC motor should be positioned to move the walkway surface. Deploy the Smart Zebra Crossing at a suitable location for pedestrian use. Regularly check the system for any issues or malfunctions, and perform maintenance as equired. By integrating with traffic management systems, smart crossings can synchronize with traffic lights, pedestrian signals, and other road infrastructure to optimize traffic flow. This can lead to reduced congestion and smoother traffic movement. Smart crossings often include Accessibility features such as audible signals, tactile indicators, and visual aids for visually impaired individuals and those with mobility challenges.

➢ *Arduino Uno*

Arduino Uno is a microcontroller board based on the ATmega328P microcontroller. It had been designed for beginners and enthusiasts to help them create interactive and new projects with ease. The board consists of 14 output/input digital pins and 6 analog input pins, quartz crystal oscillator of 16MHz and has many components such as USB connection, ICSP header, USB connection, a reset button, a power jack.

The Arduino programming languages such as C and C++ is used to program the Arduino Uno board; the language C and C++ are very easy to learn and consist of very simple syntax. which makes it easy to understand to beginners. The Arduino Integrated Development Environment (IDE) is used for writing the Arduino program and for uploading program to the Arduino board.

The board can be powered by using USB cable with a battery or external power supply. It is suitable with a wide range of shields, which can be used to add the additional boards that can be mounted on top of the Arduino Uno to add more functionality.

Some of the popular projects that can be built with Arduino Uno include robotics, home automation, environmental monitoring, and many others. With its low cost, simplicity, and flexibility, Arduino Uno has become a popular choice for DIY enthusiasts and hobbyists.

Fig1 Arduino Uno

➢ *Dc Motor*

DC motors are rotary electrical motors. These are used to convert DC (direct current) electrical energy into mechanical energy. The commonly types of forces produced by induced magnetic field on account of current flowing in the coil. Approximately internal mechanism of all types of DC motor is similar. The DC motors are the first kind of motors which are broadly used. The direct –current lighting power distribution system is used to power the DC motors. The varying current in the field winding or variable voltage supply are responsible for the variable speed of the DC motors over a wide range. The lightweight universal motor is used for portable power tools and appliances can operate on direct current and alternating current. Currently larger DC motors are used in propulsion of electric vehicles, elevator and hoists.

The use of power electronics has made replacement of DC motors with AC motors in many applications.
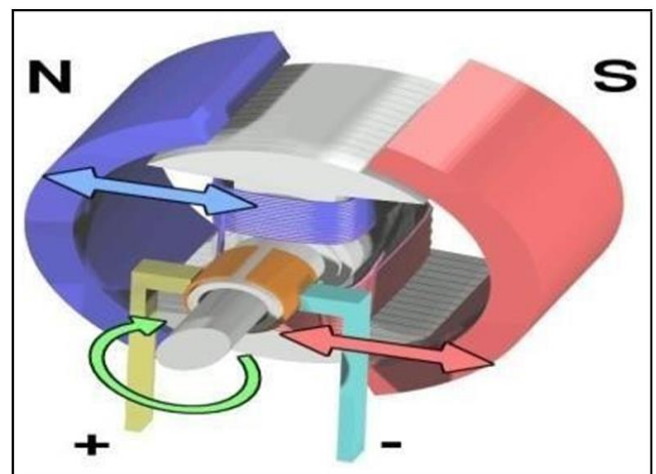

Fig 2 DC Motor

➢ *Servo Motor*

The servomotor is a very important device for the projects. The servomotor consists of either linear actuator or rotator actuator. It is used for the purpose of precise control of angular or linear position, velocity and acceleration. It consists of suitable and fixed motor coupled to a sensor for position feedback. The advance controllers are required to control the servomotors. The servomotor is basically related to the closed loop system. Servomotors are used in the applications such as robotics, CNC machinery, and automated manufacturing.

Fig.3 Servomotor

IV. RESULT AND CONCLUSION

➢ *Improved Safety:*

The system will provide a clear and automated way for drivers and pedestrians to cross the road, reducing the risk of accidents and improving overall safety.

➢ *Increased efficiency:*

The system will reduce the time taken for pedestrians to cross the road by automating the process of opening and closing the barrier, and by providing a clear indication of when it is safe to cross.

Cost-effective: The system can be built using relatively inexpensive components such as Arduino Uno board, servo motor, barrier, and IC, making it a cost-effective solution for pedestrian safety.

➢ *Easy to maintain:*

The components used in the system are easy to maintain and replace, reducing the downtime and maintenancecosts associated with the system.

Overall, a smart zebra crossing using Arduino Uno, sevo motor, barrier, walkway, IC, and trafic lights can provide an efficient and cost-effective solution to improve pedestrian safety and efficiency at crossings.

➢ *Pedestrian Priority:*

Smart zebra crossings can give pedestrians priority when crossing the road, especially during peak times or when there is a high footfall. This helps in making urban areas more pedestrian-friendly and encourages people to use non- motorized modes of transport.

➢ *Future-Readiness:*

As technology continues to advance, smart zebra crossings can be easily upgraded and integrated with evolving transportation systems, making them future-ready and adaptable to upcoming smart city initiatives.

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