



Smart Pedestrian Crossing System Using Light-Detecting Sensor

S Keerthana^[1], Mr. A. Charles Mahimainathan^[2]

^[1]UG Scholar, Department of Computer Technology, Sri Krishna Adithya College of Arts and Science, Coimbatore.

^[2] Assistant Professor, Department of Computer Technology, Sri Krishna Adithya College of Arts and Science, Coimbatore.

ABSTRACT

The Smart Pedestrians Crossing system is an innovative technology that seeks to improve pedestrian safety by utilizing a sensor-based system. The system aims to prevent accidents by effectively crossing the road in heavy traffic. Most people find it difficult to cross the road, especially senior citizens, differently-abled and children. This system will be beneficial for them to cross the road quickly and safely. The microcontroller connected to the traffic signal automatically detects and processes according to the signal. When the green signal emits, the vehicle is halted simultaneously the pedestrian will start to move automatically and it will stop when the red signal expose. ^[5]This technology can be used to reduce the number of pedestrian casualties and improve overall road safety.

KEYWORDS – Arduino, Population, Traffic, Pedestrian Safety, Barrier Control, Accident Prevention.

1. INTRODUCTION

^[2] Technology is extensively developed in this hectic world. Countries around the world are focusing more on technology development. Many inventions make our life easier and safe. One of them is smart pedestrian crossing which is used to prevent road crashes and helps blind people to cross the road. People lead busy lives and are ignorant of rules and regulations. ^[1]Road accidents are increasing day by day around the world, mainly in a highly populated country like India. Crossing the road at random is risky and can lead to physical injuries and accidental deaths. The implementation of smart pedestrian crossings is easy to install and maintain.

2. EXISTING SYSTEM

^[5]The pushbutton detector is the common form of detection used for pedestrians. The push button is located on a pole or signpost near the crosswalk. This technology enabled pedestrians to press buttons installed on both sides of the road that allows pedestrians to signal their intention to cross the road. ^[5]Once the initial service call is made, the length of time the circuit is open or the number of additional button presses does not affect the operation of the controller. A verbal message is presented to pedestrians under two conditions. ^[5]A verbal message during the walk interval may indicate the WALK signal that is activated to cross the named street. A verbal message during the flashing or steady DON'T WALK, known as a push button information message, can provide intersection identification information and information about signs or unusual geometry at a crosswalk-specific road. However, since installation, the system has been of no use. During a recent visit, this correspondent found the countdown timers not working, and some bulbs for the signals gouged out from the sockets.

3. DRAWBACKS

- Limited Accessibility: Push pedestrian crossings can be difficult for people with disabilities to use, as they often require physical strength to operate the button.
- It can be confusing for drivers and pedestrians to know when to cross the road.
- It can be unreliable, as the button may not activate the crossing signal if it is not pressed correctly or is broken.
- It also can be hazardous for people crossing the street, as drivers may not be expecting pedestrians to cross the road.
- They require additional infrastructure and wiring.

4. PROPOSED SYSTEM

^[1]Traffic control management systems around the world are becoming more technologically oriented in the 21st century, and IoT automation has reached the point of advancement of this technology. In other words, the process of automation is limited to developed countries or some developing countries. ^[3]Despite being dependent on technology, many developing and underdeveloped countries still rely heavily on traffic.

^[6]The pedestrians cross the lane, usually due to a lack of space on the sidewalk and without paying attention to oncoming traffic, mainly because their attention is distracted. Pedestrian illegal crossing behavior is a major fact in road safety issues. According to senior officials of the World Health Organization, more than 1.3 million people are killed in traffic accidents every year, more than two people every minute, and nine out of ten deaths occur in low- and middle-income countries. "Pedestrian deaths account for around 30 percent of all deaths from road traffic crashes in India. In some large Indian cities, the proportion of pedestrians killed is up to 60 percent of all road traffic deaths," said Geetam Tiwari, a professor at IIT Delhi.

This paper proposes an IoT-based smart crossing device, to provide a simple answer to a controversial and day-to-day problem. A fully automated pedestrian crossing with barricades is a system that is designed to automatically open and close barriers to prevent motorists from entering the pedestrian crossing. This system can be used to improve the safety of pedestrians by reducing the risk of collisions between vehicles and pedestrians. In addition, the system can also be used to improve traffic flow by preventing vehicles from entering a pedestrian crossing when it is not in use.

5. FEATURES

INCREASED SAFETY: Smart Pedestrians Crossing by creating a physical barrier between pedestrians and approaching traffic, barricaded crossings help enhance pedestrian safety. Accident and injury risks decrease as a result.

IMPROVED VISIBILITY: The barricades' vivid colors are easier for cars to see, which serves to warn them of the presence of pedestrians. This increases the likelihood that motorists will slam on the brakes and stop as they approach a zebra crossing.

EASIER ACCESSIBILITY: The barricades provide a physical barrier that makes it easier for pedestrians to access the zebra crossing. This is especially beneficial for those with mobility issues or those using wheelchairs.

REDUCED CONGESTION: Reduce traffic congestion by allowing pedestrians to cross the road quickly and safely. This helps keep traffic flowing and reduces the chances of vehicles getting stuck in a jam.

^[2]This system can deeply manage urban traffic, reducing traffic jams and pollution and it also can be used in hospitals, industries, schools, and colleges.

6. METHODOLOGY

Smart Pedestrian Crossing is an IoT-based automation project. Pedestrians Crossing is a way for vehicles and people to cross the road. It uses an Arduino Uno as a microcontroller which is connected to the traffic signal, and servo motor. The traffic signal is set for the predefined amount of time that turns the signal to red and green. When the green light flashes, the pedestrian starts moving from one end to another by connecting to the DC motor and there is a barricade that is connected to the servo motor, that objects to the barricade at some specific angle or distance. The Servo motor controls the gate according to the signal. When the signal turns red, the gate will be opened and the pedestrian is immobilized.

7. HARDWARE

- Arduino Uno R3
- DC Motor
- Servo Motor
- Battery
- LCD Display
- Relay Module
- Jumper Wires
- LED Light

7.1 Arduino Uno

Arduino Uno is a microcontroller board that can be integrated into a variety of electronic projects. Arduino consists of both a programmable physical circuit board and a piece of software or IDE running on your computer. Arduino IDE used machine code to write and transfer to the Arduino physical board.



7.2 DC Motor

A DC Motor is any of a class of rotary electrical motors that converts electrical energy into mechanical energy. It relies on the forces produced by induced magnetic fields due to the flowing current in the coil.



7.3 Servo Motor

A servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration. It is used in applications such as robotics, CNC machinery, and automated manufacturing.



7.4 Battery

A Battery is a source of electric power consisting of one or more electrochemical cells with external connections for powering electrical devices. When a battery is supplying power, its positive terminal is the cathode and its negative terminal is the anode.



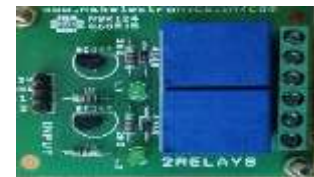
7.5 LCD Display

An electronic device that is used to display data and the message is known as LCD 16x2. As the name suggests, it includes 16 Columns & 2 Rows so it can display 32 characters (16x2=32).



7.6 Relay Module

The Relay Module is a convenient board that can be used to control high voltage, and a high current load such as motor, solenoid valves, lamps, and AC load. It is designed to interface with a microcontroller such as Arduino, PIC, etc.



7.7 Jumper Wires

A Jumper wire is an electrical wire, or group of them in a cable, with a connector or pin at each end, which is normally used to interconnect the components

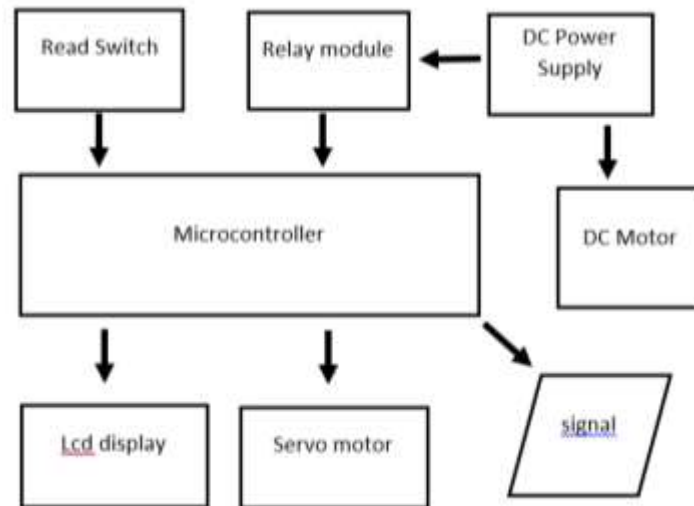


7.8 LED Light

LED light bulb is an electric light that produces light using light-emitting (LEDs).



8. SYSTEM BLOCK DIAGRAM



9. CONCLUSION

The prototype discussed in this paper prevents pedestrians from an accident during heavy traffic areas.^[4]The system minimizes the risky transport market and the system's reliability and simplified economics contribute, making it a challenging project that hardly considers regulations.^[6]Hundreds of people die in road accidents every year. Particularly in road crossings. Installing smart pedestrian crossing with barricades is a beneficial and cost-effective way to improve road safety and reduce traffic-related fatalities and injuries. These crossings allow pedestrians to cross the road safely and quickly, while also providing a visual deterrent to drivers to slow down and be aware of pedestrians. Furthermore, the addition of barricades can help to further protect pedestrians, increasing the safety of all roads.^[6]It can also be installed in schools, hospitals, and industrial areas. Therefore the implementation of smart pedestrian crossing is a worthwhile investment to install. This system is a great way to improve road safety and reduce traffic congestion.

REFERENCES

- [1] Muntasir Rahman, Jia Uddin, Md Quamar, Rakib Hossain, Alam Nirob February 2018.
- [2] Nishi Mittal(2010), Pedestrian Safety At Urban Intersections In Delhi, India (Indian Journal of Transport Management)
- [3] Pedestrian crossing behavior analysis at intersections by Akash Jain¹, Ankit Gupta², Rajat Rastogi³ Study.
- [4] Aravind C, Suji Prasad S J and Ponni Bala M 2020 Remote Monitoring and Control of Automation System with IoT International Journal of Scientific & Technology Research 9 945-9
- [5] David A.Noyce Transportation Research Board, Washington, D.C. January 2005.
- [6] Abhijit Pathak, Md.Adil, Md.Jabed Hossain Smart crossing system with object tracking.