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Abstract- **In many underdeveloped and developing countries, the custom and laws of crossing the roads are not very strict, in which case an automated road crossing system is much needed. Besides, the amount of risk being taken every other day around us, only makes the case for an automated zebra crossing system stronger. Our idea is to make dynamic time for signal using sensor. A pedestrian crossing called zebra crossing has to be designed with a PIR (passive infrared) sensor which detects the human presence on the either side of the road and transforms the signal to the stop light which insist the pedestrian to cross the road. The system incorporates the concept of smart sensing to detect the presence of pedestrians and in turn, automatically controls the crosswalk traffic lights. The system composes of two Arduino microcontrollers, two infrared PIR motion sensors, and a IOT for transmitting the signal among traffic light units on both roadsides. The system is fabricated and implemented as a portable LED-based traffic light testbed. The developed system is cost-effective, energy efficient, easy to install, and maintenance-free.**

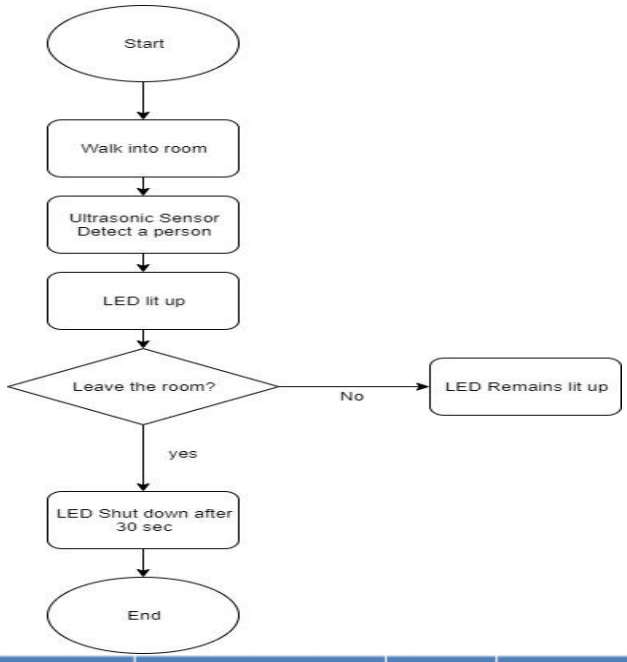
Keywords: **Arduino, Passive infrared Sensor, Automated Zebra Crossing, LED, crossing area, pedestrian, smart system, traffic light, wireless.**

I.INTRODUCTION:

As the world keeps growing with advanced technology and more people are required for it, the main roads in the city or any pedestrian's walk spaces become hustle and bustle nowadays. Therefore, any street crossing area may be less safe. Walking is also an essential mode to support the public transport systems, improving the overall liability of the city, providing accessibility within built areas, and providing an alternative to private vehicles for short-distance trips. Short-distance trips are common in Indian cities characterized by very high population densities and mixed land-use development. As walking is an important mode, with estimated mode share value of around 30%, a report published by Asian Development Bank in 2009 revealed that the per capita travel length of the pedestrians is ranging from around 1 km/day in Shimla to around 7 km/day in Surat city (ADB, 2009).Hence, pedestrians are the most vulnerable road users, and their safety has to be at the highest priority. As a result of being a particularly susceptible road user. Pedestrian deaths mainly can be traced to pedestrians walking along the roads. There are a variety of reasons why a pedestrian would choose to walk on the road, increasing the risk of colliding with a vehicle. Traffic issues cause not just inconvenience but also impacts economically. Traffic congestion issue can be solved by multi-pronged approach. Due to lack of footpaths in many places, pedestrians are forced to walk on the edge of roads which further increasing traffic issues. Pedestrian crossing control systems were developed with the intention of pedestrians' safety and traffic management. Many types of control systems for cross-walk management have been proposed in the literature and few were implemented in practical deployments. This was done by developing decision-making tools for identifying the needs for traffic control, thus enabling pedestrians to safely cross the roadway. Other than the fact that people are unwilling to abide by the rules, it should also be noticed that crossing roads at random is risky and may result in untimely and accidental deaths. So, to bring forward a simple solution to this day-to-day and controvertibly burning question, this paper presents an automated system, that takes in some valuable parameter to calculate the necessity and frequency of a zebra crossing to be active and inactive. For the system to be cost effective and easy to build and maintain, Arduino-UNO and PIR sensors have been used. PIR sensors take in the measurement required for the system to understand the number of people that need to cross at a particular time and the Arduino processor calculates this measurement alongside other important parameters, such as, time, characteristics of the road etc. The proposed system is very easy to install and is very cheap, and this point is accented because it is proposed especially for underdeveloped and developing countries with low budget on hand to walk on the path of automation in traffic control system .This paper specifically presents the design, implementation, and validation of a portable smart wireless pedestrian crossing control system. It facilitates the detection of pedestrians using PIR motion sensors and automates the switching of traffic light according to sensor outputs. The core contribution of this paper is the development of a portable, cost-effective, easy to install and maintain automatic wireless pedestrian crossing control system to continuously monitor the presence of pedestrians and automatically control traffic lights to allow people crossing the road safely and efficiently. The key contributions of this study are listed as follows:

i) Design and implementation of an energy-efficient LED-based pedestrian crossing control system with wireless support.
ii) A novel concept for detecting pedestrian at crossing area and organizing the traffic is proposed.
iii) An algorithm implemented in Arduino is developed to perform dynamic control based on PIR sensors' status.

II. LITERATURE SURVEY

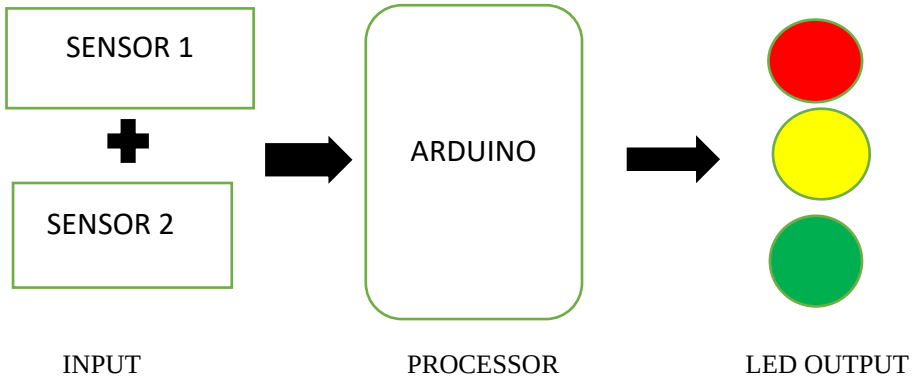


S.NO	Title	Authors	Year	Problems Defined	Draw back
1	An automated zebra crossing using Arduino-uno	A M Muntasir Rahman Md. Quamar Mehdi Md.Rakib Hossain Efakhar Alam Nirob	2018	Traffic congestion Risk of crossing road	Implementation requires many hardware
2	Design and implementation of portable smart wireless pedestrian crossing control system	Wasen kadhim saad Yasir hashim Waheb A.jabbar	2020	Vulnerable to use roads Accident rate increasing	Low range connection
3	Application for detection of pedestrian position on zebra crossing	Puji hastuti Lokito edi Nugroho Wayan mustika	2022	People moving out from the path	Location based service
4	Motion classification of pedestrian walking behaviors on the sidewalk	Gihyun han Heejae choi Bongsob song	2015	Check on walking behaviors	Barking system creates disturban
5	Design of road surface lighting system for rear lamp using automotive ultrasonic sensor	Donghee han Hyo bin choi Yong sin kim	2018	Accident rate	Too bright lights harm

III.PROPOSED WORK FLOWCHART:

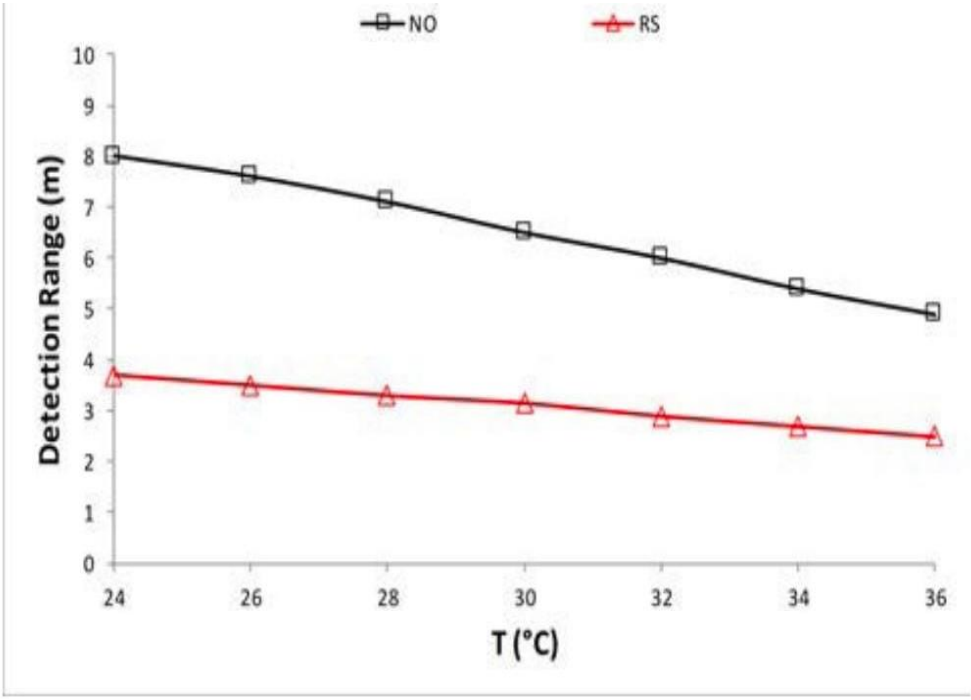
The area of automation in traffic control systems has been significantly explored throughout the years. One significant such work has been done back in 2013; the system had the capability to check for violation of traffic rules committed by the ultrasonic sensor is one of our main components and serves wonderfully to provide perfect input data to measure the required parameter for our system. The sensor model that we used, basically use an ultrasonic sound to measure a distance or depth like a bat would do. It has an ultrasonic transmitter and a receiver module. The sensor sends out a sonar and tries to catch the echo and using the timing in between of the two measures the distance in front [10]. For the gate on the footpath side to control a servo motor was needed. But it is necessary to mention that the servo used in the prototype will not be sufficient for the real life scaled model as the SG90 Micro servo has a very low torque (2.5 KG-cm) and a weight of (14.7g) which is conspicuously not enough to withstand the weight of a gate in real life model. The Micro Servo has 3 pins, the one labeled 5V is connected to the high point of the power source and the GND to the ground [11]. The micro servo can rotate 180 degrees approximately. For the hardware implementation, at first the proposed model had been sketched onto a circuit diagram and later following the diagram we implemented the entire hardware system. We have tried to keep the circuit as simple as possible for better maintenance in the future. The proposed model is a real life archetype and a prototype, which is a miniature scaled model of the real life system, has been built for understanding and showcasing the capabilities of our intended system. The above mentioned apparatuses have been used to implement the entire system, and PVC boards and color papers have been used to model the prototype structure of the automated Zebra Crossing system.

BLOCK DIAGRAM:



The way the system works is that the first sensor will let the system know whenever there is a person getting ready to cross the road and the second sensor will confirm his/her presence and increase the people count by 1. After a certain amount of count, which will be learnt by the characteristics of the road and place, the system will let the traffic signal know that it is time for the signal to go yellow and in turn to red and the gate to open for the people to cross the road. The intelligent part of the system is that it will recognize whenever a person leaves the lobby, be it because he/she no longer requires to cross the street/road, or be it because she/he thinks that the system can be outsmarted by crossing the sonar several times and increasing the counter for people present. In other words, whenever there is a situation that the second sonar gets a reading and consequently the first sonar gets a reading the system will automatically decrement the value of people present by 1. The same will happen even if someone just crosses the first sensor and never crosses the second sensor.

IV.TECHINIQUE: Autonomous and automated zebra crossing using PIR Sensor.



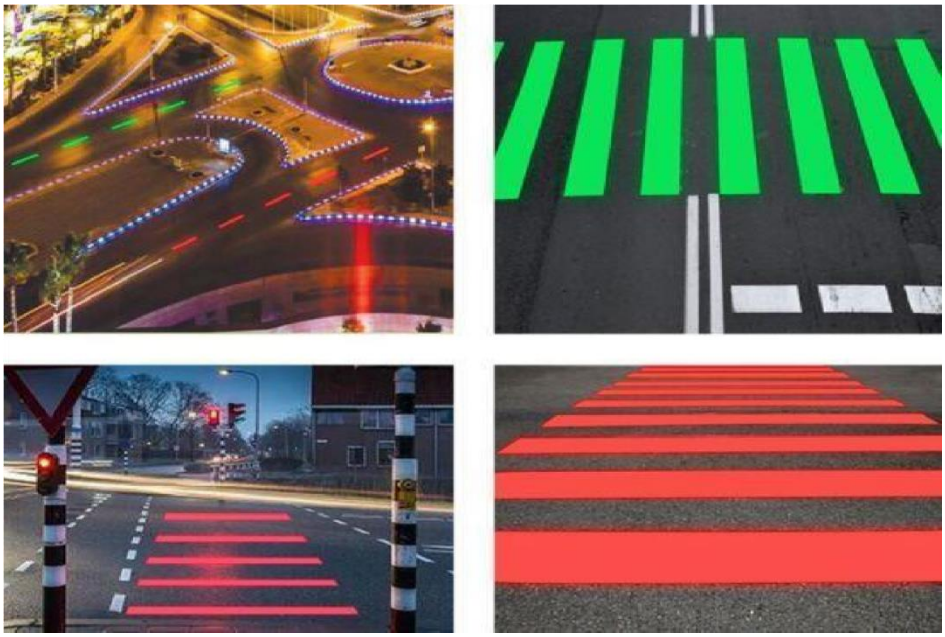
V.CONCLUSION:

We have developed a portable, smart, and wireless-enabled traffic light system for the crosswalk. It is an efficiently functioning testbed to improve pedestrian safety and convenience by automating traffic light control based on the detection of pedestrians. This system helps pedestrians to cross the road safely without extra efforts to activate the walk signal. Besides, the cost of system installation and construction, needs for maintenance and energy efficiency of the system were among our main considerations. The portability nature of the system makes it easy to move and deployed in temporary locations like in universities and schools to help students at in/out times. The system tested is able to save energy and deduct electricity bills by exploiting LEDs with rechargeable batteries. There are several limitations to this research that have found. One of them is the PIR sensor which has a very wide detection range which is 120 degree and distance of a minimum 3 m. Because of that, the PIR sensor will give a false signal because it can detect the presence of pedestrians at far from the traffic light. To solve this problem, the PIR sensor put inside a hole to narrowing the angle to

45 degree instead and reduce the distance of sensor detection. The utilization of IoT and 5G communication networks in the future to monitor such crosswalk systems will be helpful. The system removes the risky business of road crossing to a minimum and the cost effective and simplicity of the system gives value to it to the point that it becomes a demanding project for developing and underdeveloped countries where traffic laws are hardly followed . The implementation of PIR sensors in the system adds to its cost effectiveness, when in comparison with existing automation of such system. It is hoped that theproblems and risks involved during road crossing will be removed due to the implementation of this project in busy roads throughout developing and underdeveloped countries.

VI. FUTURE WORK:

● Implementation of LED light tiles in ground for safety measures of children



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