Integrating Smart Traffic Management and Electric Energy Generation at Intersections

ENEL 678: Graduate Project in Electrical Engineering

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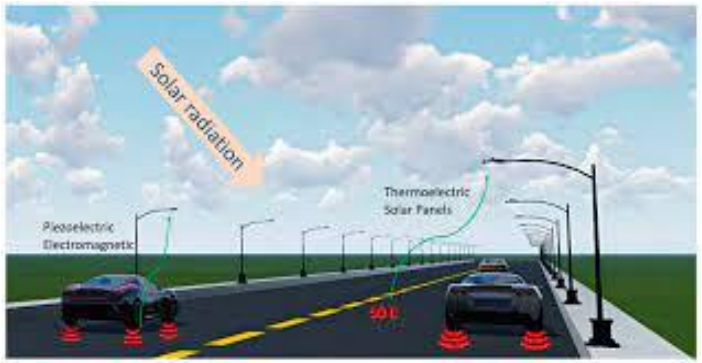
Introduction

55% of the population are urban residents[1]. The transportation architecture has to develop to accommodate a increasing amount of moving cars.

Motivation

Smart Traffic Solutions:

- Reducing waiting time
- A smoother driving



Piezoelectric Sustainability:

- Renewable energy to light up street light

Pedestrian Authority for Safer Crossings:

- Safe crossing for pedestrian

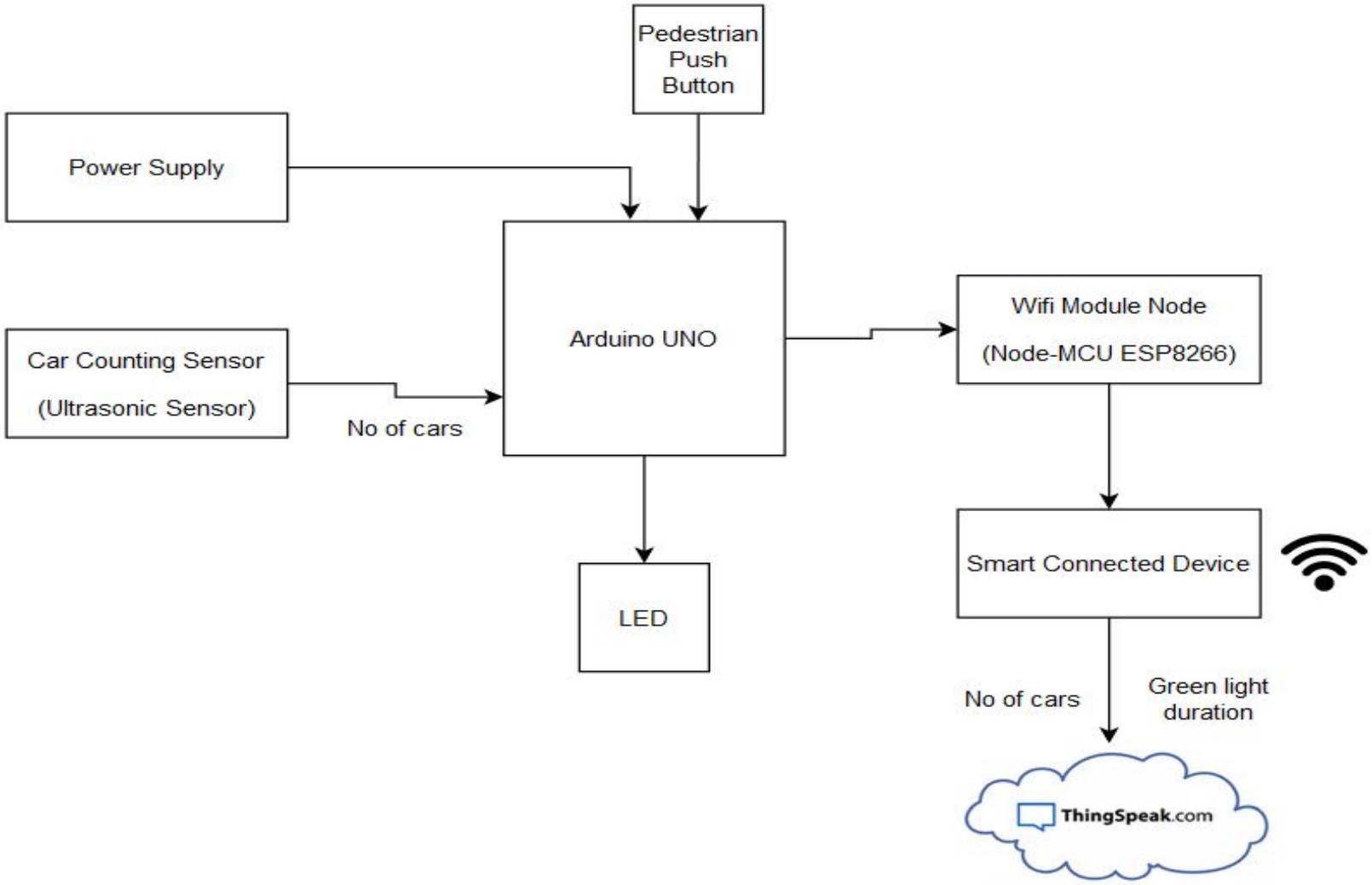
Proposed Solution

Adjust the length of time that the green light is active for a specific traffic signal at an intersection.

A pedestrian push button will reduce green light time, prioritizing pedestrian crossings.

Converting the mechanical stress from the vehicle into a stored DC voltage to power street light.

Planned Methodology



Planned Methodology(Cont.)

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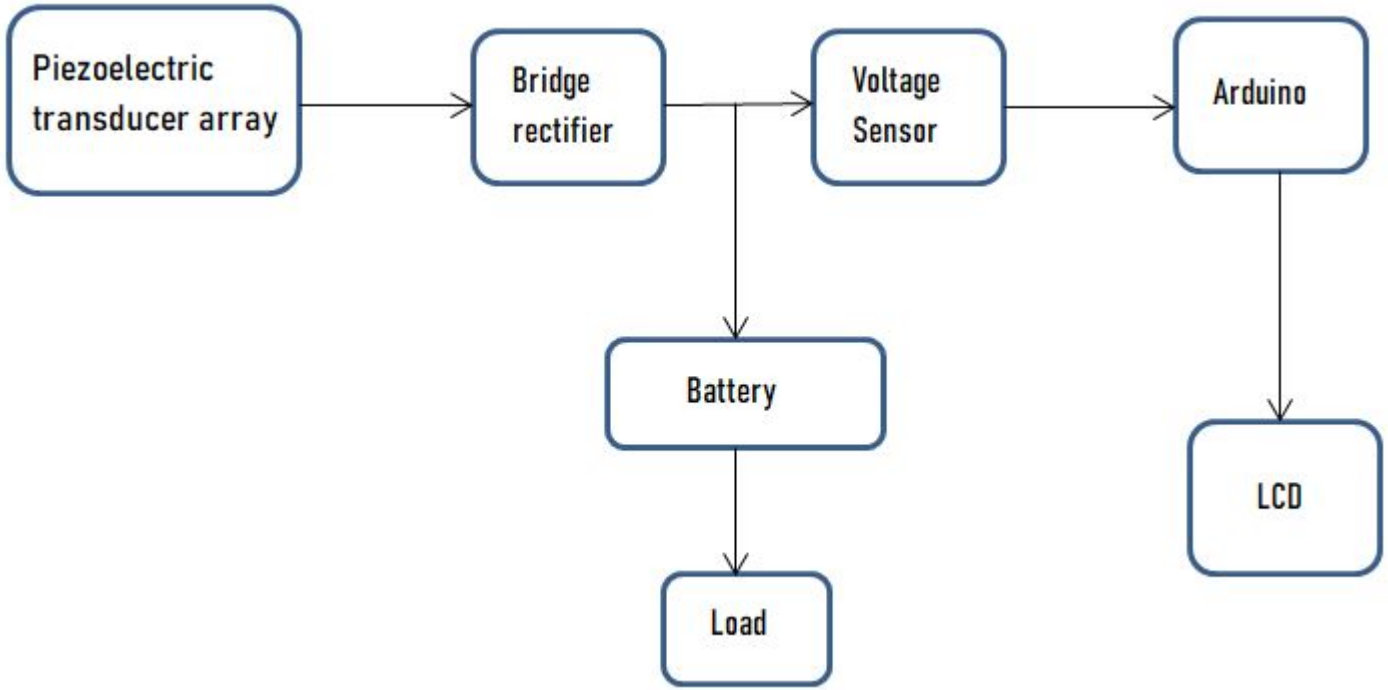
Piezoelectric Sustainability

- Concept of piezoelectricity.
- Planned usage in project.



- Relevance, future scope of improvement & implementation.

Equipment List

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No.	Component	Description
1	Arduino UNO	Microcontroller
2	Ultrasonic Distance Sensor Module	Uses ultrasonic waves to measure the distance to an object
3	Piezoelectric Ceramic Vibration Sensor	Reacts to variations in strain by producing a detectable output voltage change
4	Wi-Fi module Node-MCU ESP8266	Gives the microcontroller access to WiFi network
5	Breadboard	For prototyping
6	Push Buttons	Creates a digital input for the Arduino when pressed
7	LEDs, LCD	For demonstration of output
8	Jumper Wires	For making connections
9	1N4007 Diode	Used for rectification purposes
10	Capacitor	47uF
11	Resistor	1k ohm
12	Battery	To store voltage from piezoelectric generation

Roadmap Design

- Jan 10 - Jan 31 : Project selection, planning
- Feb 1 - Feb 10 : Self training on Arduino UNO and connections.
- Feb 11 - Feb 16 : Collecting components, initial project implementation.
- Feb 17 - Feb 29 : Implementation of programming in Arduino IDE.
- March : Final project implementation and testing.

Teams:

Kumkum: Smart traffic control circuit

Arpita: IDE programming

Naveen: Piezoelectric power generation circuit

Reeja: Pedestrian incorporation in traffic control

Reference

1. United Nations. (2018, May 16). 68% of the world population projected to live in urban areas by 2050, says UN | UN DESA | United Nations Department of Economic and Social Affairs. the United Nations. Retrieved January 23, 2024, from https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html


Thank you!