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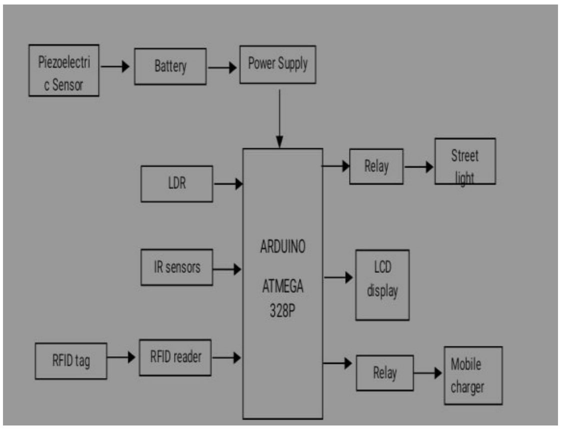

Fig .1: Block diagram

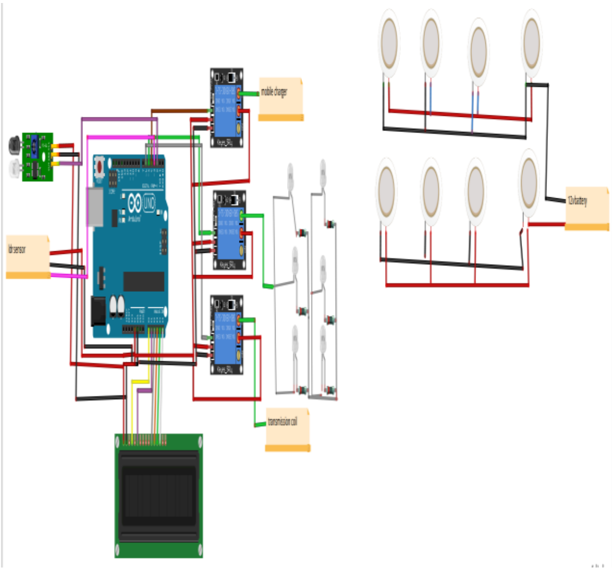

Fig. 2: Circuit diagram

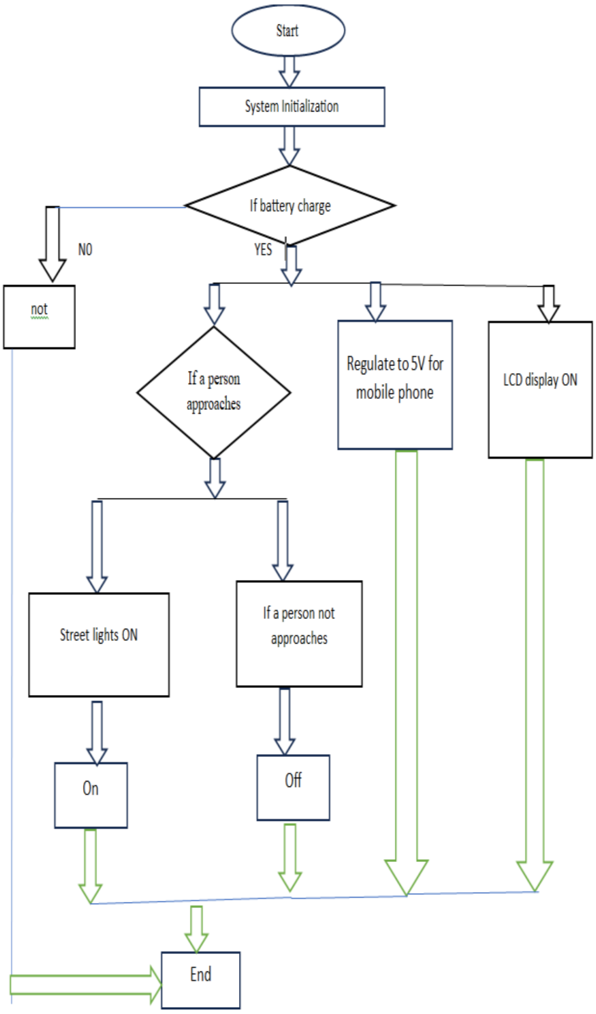

fig.3. Flow Chart

REQUIRED COMPONENTS:

1. ARDUINO UNO:

One of Arduino's standard boards is the UNO. Here, UNO is an Italian word for "one." To distinguish the initial release of Arduino software, it was given the designation UNO. Additionally, it was Arduino's first USB board to be released. It is regarded as a strong board that is applied to many different applications. The Arduino UNO board was created by Arduino.cc. The Arduino UNO microcontroller is built around the ATmega328P. In contrast to other boards, like the Arduino Mega board, etc., it is simple to use. The board is made up of shields, additional circuitry, and digital and analog input/output (I/O) pins. Six analog pin inputs, fourteen digital pins, a USB port, a power jack, and an ICSP (In-Circuit Serial Programming) header are all included in the Arduino UNO. The programming is done using IDE, which stands for

The PWM pins can be used for pulse width modulation. The Arduino UNO's crystal oscillator operates at a frequency of 16 MHZ. Moreover, an Arduino Wi-Fi module is built within it. This Arduino UNO board is built on the ATmega328P microprocessor and integrated Wi-Fi ESP8266 module. The Arduino board's input voltage ranges from 7V to 20V.

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Fig.4.Arduino Uno

2.Piezo Sensors:

Piezo sensors, short for piezoelectric sensors, are versatile and highly sensitive devices that convert mechanical stress, vibrations, or pressure into electrical voltage. They are based on the piezoelectric effect, where certain materials generate an electric charge in response to mechanical deformation. Piezo sensors find widespread applications in various fields, from industrial and automotive sectors for measuring force and pressure to musical instruments and consumer electronics for touch and vibration sensing. Due to their compact size, reliability, and rapid response, piezo sensors are integral components in a wide range of devices and systems, enabling precise measurements and enhancing our ability to interact with the physical world.

Fig.5. Piezo sensor

3.LDR Sensor:

An LDR sensor, or Light-Dependent Resistor sensor, is a passive electronic component that exhibits a change in its electrical resistance in response to variations in incident light intensity. LDRs are typically composed of semiconductor materials that become more conductive as the ambient light level increases and less conductive in low-light conditions. They are widely used in numerous applications, including automatic lighting control, camera exposure control, and light-sensitive alarms. LDR sensors play a crucial role in enabling devices to respond to changes in the surrounding illumination, making them valuable tools for enhancing energy efficiency and automating various processes that rely on light sensitivity.

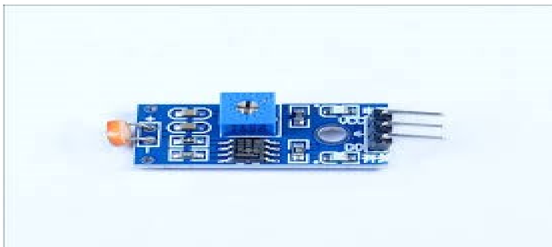

Fig.6. LDR sensor

4.IR Sensor:

An IR sensor, or Infrared sensor, is a device that detects and measures infrared radiation in its surroundings. These sensors are commonly used for proximity sensing, object detection, and motion detection applications. IR sensors work by emitting and receiving infrared light. When an object is in proximity or moves within the sensor's field of view, it reflects or emits heat in the form of infrared radiation. The IR sensor then detects this radiation and translates it into an electrical signal, triggering a response or providing data about the object's presence or movement.IR sensors are found in a wide range of devices, including security systems, automated appliances, and remote controls, making them essential for various sensing and control applications.

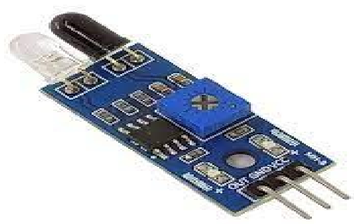

Fig.7. IR sensor

5.RFID Sensor:

An RFID reader, which stands for Radio-Frequency Identification reader, is a device that interacts with RFID tags or labels to retrieve data stored on them. These tags contain electronically stored information that can be wirelessly read or written to by the RFID reader. RFID readers use radio-frequency waves to communicate with the tags, making them highly convenient for applications such as access control, inventory management, asset tracking, and contactless payment systems. These readers come in various forms, including handheld devices, fixed readers installed in gates or doorways, and integrated readers in smartphones and smart cards, enabling a wide range of applications across industries for efficient and automated data capture.

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Fig.8.RFID sensor

6.LCD Display:

An LCD, or Liquid Crystal Display, in the 16x2 configuration, refers to a small screen commonly used in electronic devices, such as digital thermometers, calculators, and many consumer electronics. The "16x2" indicates that the LCD screen consists of 16 characters in each of the two rows, making a total of 32 characters available for displaying text or information. These displays are well-suited for presenting basic textual data or simple graphics, thanks to their simplicity and low power consumption. LCDs operate by manipulating liquid crystals to control the passage of light, making them a popular choice for providing clear and readable information in a compact format for various applications.

Fig.9.LCD display

7.Relay:

A relay is an electromechanical switch used to control the flow of electrical current in a circuit. It operates by using a small electrical signal to activate an electromagnet, which in turn, mechanically switches a larger electrical load on or off. Relays are essential components in various applications, such as automation, electrical control systems, and safety circuits. They allow low-power electronic devices, like microcontrollers, to control high-power devices such as motors, heaters, and lights. Relays serve as a crucial interface between digital and high-power electrical systems, enabling the automation and remote control of numerous processes and devices across different industries.

Fig.10.Relay

8.BATTERY:

A rechargeable battery is an energy storage device that can be charged again after being discharged by applying DC current to its terminals. Rechargeable batteries allow for multiple usages from a cell, reducing waste and generally providing a better long-term investment in terms of dollars spent for usable device time. This is true even factoring in the higher purchase price of rechargeable and the requirement charger. A rechargeable battery is generally a more sensible and sustainable replacement to one-time use batteries, which generate current through a chemical reaction in which a reactive anode is consumed. The anode in a rechargeable battery gets consumed as well but at a slower rate, allowing for many charges and discharges.

Fig.10.Battery

SOFTWARES USED:

ARDUINO IDE : Arduino IDE (Integrated Development Environment) is an official program developed by Arduino.cc for creating, compiling, and uploading code to Arduino devices. Almost all Arduino modules are compatible with this open-source software, which can be installed and used to compile code while on the go.

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RESULTS:

Additionally, the project can promote awareness of eco-friendly practices by showcasing the potential of energy harvesting from human movement. The RFID sensor could be utilized for participant engagement, logging individual contributions. The relay might enable control over external devices based on certain conditions. This eco walk project combines technology, sustainability, and participant interaction for a multifaceted result. Furthermore, the harvested energy could power low-energy devices or charge small electronics, showcasing practical applications of sustainable energy. The LCD can display real-time data, such as energy generated or environmental metrics, fostering engagement among participants. Integration with a mobile app or cloud platform could enable remote monitoring and data analysis, expanding the project's impact beyond the immediate eco walk setting.

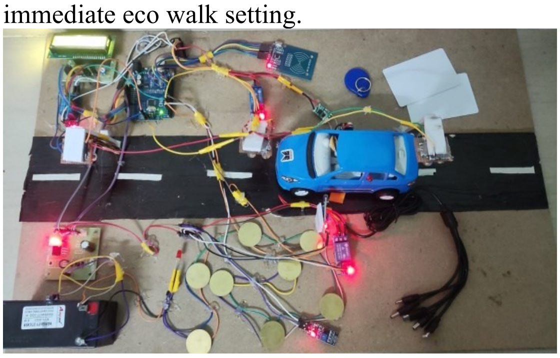

Fig.10.Hardware implementation

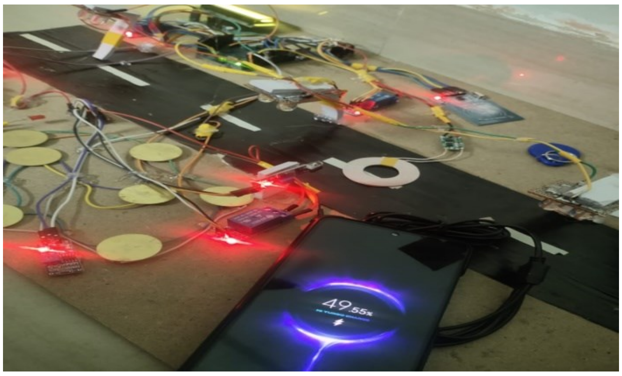

Fig.11.Using piezo electic the mobile is charging

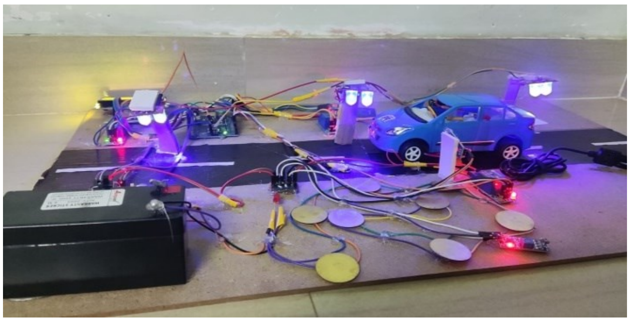

Fig.12.From the piezo electric energy the street lights are ON

FUTURE SCOPE:

Utilization of wasted energy is very much relevant and important for highly populated countries in future. The proposed work portrays the concept of Piezoelectric Energy Harvesting and the results obtained after the implementation are very encouraging. Future work of the proposed idea encompasses further amplification of the crystal output to a greater extent. Future lies in the inclusion of advanced material used to design the piezoelectric crystal which further amplifies the crystal output in terms of voltage as well as current. A study could be carried out from the variety of piezoelectric crystals and after comparing the results, the choice of the optimum material for the best performing crystal could be devised.

CONCLUSION

In conclusion, the "Eco Walk - Harvesting Energy with Every Step using Arduino Uno" project showcases an innovative and eco-conscious approach to energy generation through human motion. Through the incorporation of piezoelectric sensors and microcontroller-based technology, we have successfully demonstrated the feasibility of converting footsteps into electrical power, offering a sustainable energy solution. This project not only promotes clean and renewable energy practices but also has the potential to improve energy accessibility in various settings. While it may not fully replace conventional renewable energy sources, it represents a valuable addition to the quest for cleaner, more sustainable energy solutions, contributing to a greener and more environmentally responsible future.

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