

Smart Street Lighting with Pedestrian Detection for Women's Safety

<https://www.youtube.com/watch?v=hjWesueW3sg>

The project titled *Smart Street Lighting with Pedestrian Detection for Women's Safety* presents an intelligent and interconnected lighting system that enhances both energy efficiency and women's safety using a combination of Arduino NANO and Raspberry Pi Zero 2W controllers. The **Arduino NANO** section forms the first level of control, where sensors such as LDR, PIR, and Ultrasonic continuously monitor ambient light, motion, and object presence. Depending on these inputs, the streetlights automatically adjust their brightness—glowing at 100% intensity when motion or an object is detected, 50% during midnight for power saving, and remaining off (0%) during the daytime.

The **Raspberry Pi Zero 2W** section serves as the main processing and safety module. It interfaces with a Pi Camera, SD card, Sound Sensor, and Panic Switch for real-time monitoring and alert generation. In emergency situations, such as when the panic button is pressed or the sound sensor detects distress, the Raspberry Pi captures video footage through the Pi Camera, sends an **alert SMS** to predefined mobile numbers via the **GSM module**, and simultaneously emails the recorded video to a **registered email address** and also activate the Buzzer for alerts. Communication between the Arduino and Raspberry Pi is achieved using **LoRa technology**, which enables long-range, low-power data exchange to coordinate and control streetlights on both sides of the road. The status of the project will display on LCD.

This dual-controller approach effectively integrates smart lighting automation with women's safety mechanisms, achieving efficient power management, responsive communication, and proactive emergency alerts, thereby contributing to safer and smarter urban environments.

The main objectives of the project are:

- ☐ To design an intelligent street lighting system that adjusts light intensity automatically based on environmental conditions and pedestrian movement.

- ☐ To ensure women's safety through real-time monitoring and emergency alert features.
- ☐ To integrate GSM and Email communication for instant alert transmission during panic situations.
- ☐ To enable efficient communication between Arduino and Raspberry Pi using LoRa technology.
- ☐ To achieve significant energy savings by operating lights at variable intensities during different time periods.

The main building blocks of the project are:

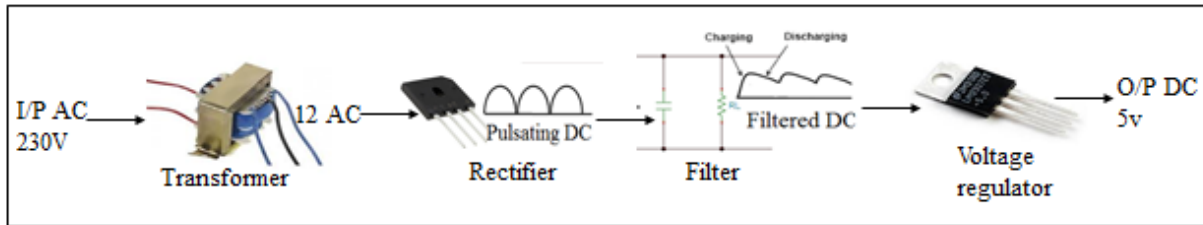
- Adapter power supply.
- Arduino UNO.
- Raspberry pi Zero 2W.
- Panic switch.
- GSM.
- LDR.
- PIR.
- Ultrasonic Sensor.
- Street Lights.
- LCD display.
- Buzzer.
- Sound sensor.
- Pi camera.
- SD card.
- LoRa Modules.

Software's used:

1. Arduino IDE for compiling and dumping C code into Microcontroller.
2. Raspbian OS.
3. Python Language.

4. Express SCH for Circuit design.

Regulated Power Supply:



Block diagram:



