

# Smart Street Light System for Power Saving

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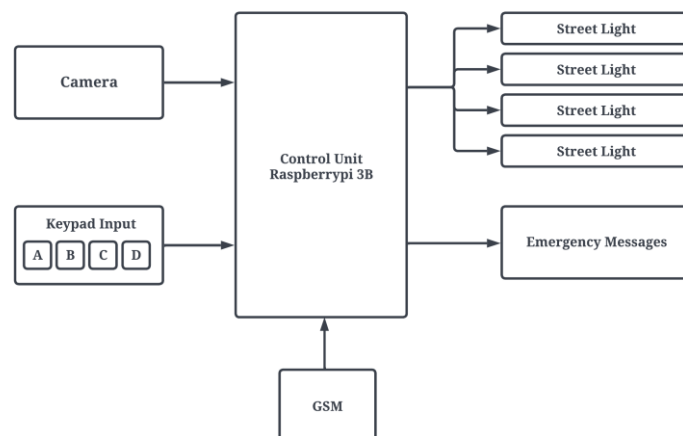
## INTRODUCTION

- There is high consumption of power in the recent days and management of power is very crucial.
- Intelligent lighting control and energy management system is a perfect solution for energy saving especially in public lighting management.
- The smart street light controls the power consumption effectively, the lights turn on before pedestrians and vehicles come and turn off or reduce its intensity when there is no movement of vehicle or pedestrian.

## OBJECTIVE

- Controlling street lights in such a way that they turn ON only when a vehicle or a person appears and stays in dim state otherwise.
- Developing an object detection model to detect vehicle and human presence.
- Creating a smart street lighting system that does not compromise public needs or safety.

## BLOCK DIAGRAM



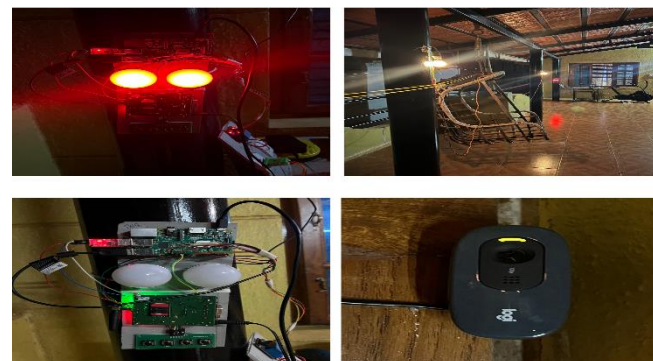
## MATHEMATICAL EQUATIONS

$$\text{Total Energy} = \text{Power} \times \text{Total time}$$

## METHODOLOGY

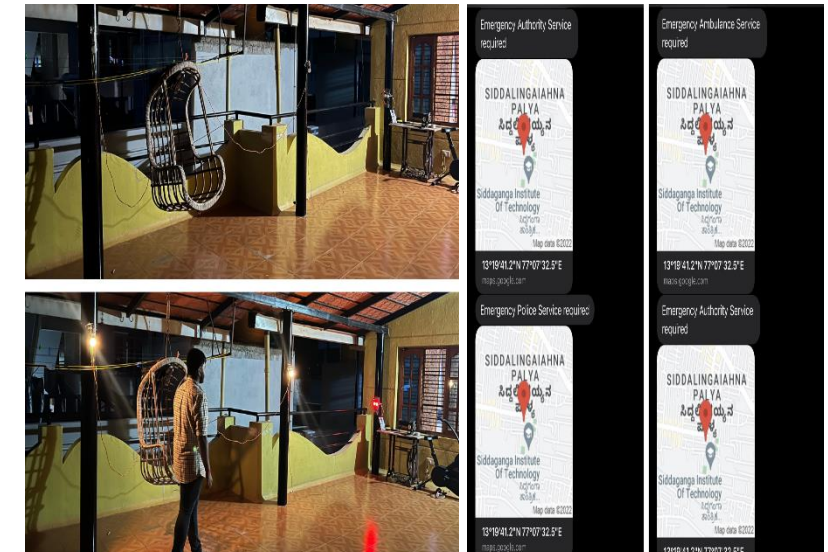
- Cameras are fixed at every four poles and is gets activated during specified hours. The live feed of the camera is fed to the control unit.
- The camera is installed at the last pole of the segment and will be monitoring the street. The control unit analyses and detects objects in the frame using the object detection model, and sends control signals to the lights only if a vehicle or a human is detected.
- If the vehicle or person is out of sight of the camera, the lights are turned off. This process will be repeated at each segment of the road.
- A keypad is integrated in the system which can be used in emergency situations such as, ambulance services, police alert, manual control of the lights and an alert for technical failure in the system.
- The system contains a GSM module which is used to send SMS alerts to the respective authorities including location

## SYSTEM HARDWARE



## EXPERIMENTAL RESULTS

- 1) The system activates at dark hours automatically.
- 2) The camera's real time video feeds are fed to the control unit.
- 3) YOLO v4 algorithm is used for objection detection.
- 4) If a vehicle or human is detected lights are turned ON until it is detected in the sight of camera.
- 5) If the vehicle or person is out of sight of the camera, the lights are turned off , this process is repeated with all the video feeds.



- The object detection model runs various processes to detect and track the vehicle and human.
- YOLO takes an input image and then the framework divides the input image into grids.
- Image classification and localization are applied on each grid. If any object is present in the frame, YOLO predicts the bounding boxes and their corresponding class probabilities for that object.
- The classes considered are Pedestrian, Car, and Motorcycle. So, each grid cell is labeled as eight dimensional vector.

## CONCLUSION

The project titled "Smart Street Light System for Power Saving" is successfully implemented and tested under optimum conditions. The smart street light system is automated and power efficient. This system is designed in such a way that it does not compromise citizen safety.

## REFERENCES

- [1] P. C. Veena, P. Tharakan, H. Haridas, K. Ramya, R. Joju and T. S. Jyothis, "Smart street light system based on image processing", 2016 International Conference on Circuit, Power and Computing Technologies (ICCPCT), pp. 1-5, 2016.
- [2] S. S. Kalyan, V. Pratyusha, N. Nishitha and T. K. Ramesh, "Vehicle Detection Using Image Processing", 2020 IEEE International Conference for Innovation in Technology (INOCON), pp. 1-5, 2020.