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Versatile Smart Stake

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Abstract :

Streetlights consume a significant amount of energy, which could be better used for other essential tasks. The primary objective of this paper is to find a solution to this issue using a smart pole system. in addition to the streetlight's auto dimming and turning on feature and a variety of other modules like a display and GPRS. The sections of the paper are as follows: A brief introduction to the subject and domain, the existing system, and our proposed model make up section 1. With the assistance of a system flow, the components necessary for the system's implementation and operation, as well as a block diagram and flow chart, Section 2 provides an overview of the system survey that was conducted on our proposed system. Area 3 gives the different benefits and disservices of the savvy shaft framework. The necessary system-derived results and observations are provided in Section 4. The conclusion and future scope of our proposed system are presented in Section 5.

IndexTerms **– Brilliant lighting, Sensors, Energy proficient, Sun oriented, Shrewd presentation, Servomotor.**

1. INTRODUCTION :

Remotely and monitoring, manage and control a large variety of devices by the platform of Internet of Things, which gives the new vision and extract information from a wide amount of real-time data and it had sensor in every objects which is connected to the internet via appropriate protocols, in order to get effective communication and information exchange, achieving intelligent system for the same.

More than 400million street lights world-wide emit 150million tons of CO_2 every year. Estimating 30% of total electric power is generated in countries used in lighting the roads and streets. Sum of the time the street lights remain on even when they are not in use this causes wasting of energy, which can be saved when automatic street light used.

Most of the street lights utilized Halogen bulbs for artificial lightning they convert electric energy to visible electromagnetic radiation. These bulbs required large amount of energy compared to LED lamps. Nearly, 80% of the total energy can be reduced by switching from Halogen bulb to LED lamps.

The main purpose of this project of "Versatile Stake" or" Smart Stake", which involves in automatic ON and OFF street lights rotatable CCTV camera, display window for advertising, SOS button for emergency purposes, mobile charging and e- vehicle charging port and one card-reader for the billing purposes, public wi-fi facility, which it has a variety of purposes it consisting of different purposes in a single stake which is also provides important functionality as per necessary requirements.

Figure 1.1: Smart pole implementation

2. *SYSTEM DESCRIPTION :*

Smart poles are made to withstand harsh environmental conditions like high temperatures, a lot of rain, and strong winds. Most of the time, they are made of sturdy materials like fiberglass, aluminum, or steel. To power the integrated systems, smart poles can be outfitted with renewable energy sources like wind turbines or solar panels. The energy from these sources is either fed into the grid or stored in batteries for later use. They utilize different correspondence innovations like Wi-Fi, Bluetooth, cell organization, and GPS to gather and communicate information to a unified administration framework. In order to keep an eye on real-time data such as traffic volume, weather conditions, air quality, and noise levels, smart poles are outfitted with a variety of sensors, including motion sensors, temperature sensors, light sensors, and environmental sensors. LED lighting is used in smart poles, which can be programmed to turn on or off based on the time of day or to respond to vehicle or pedestrian traffic. Traffic control, parking management, security cameras, and emergency response systems can all be integrated into smart poles to improve public safety and reduce congestion. Smart pole data are sent to a centralized management system, where they are processed and analyzed to provide city administrators, policymakers, and urban planners with useful insights.

3. *METHODOLOGY :*

The internet of things, or IoT, is a network of interconnected computing devices, mechanical and digital machines, things, animals, or people that can transfer data over a network without human or computer interaction thanks to unique identifiers (UIDs). Implementation contain an automatic street light system that is rather than turning on the street light, the PIR sensor detects the movement of the vehicle. In the event that there is no vehicle development streetlamp gets OFF. In the working of panic button, the street light's camera begins recording and transmits the video to the controller station when the panic button is pressed; otherwise, the camera is disabled. In the case of emergency if the person shouts for help, the street light's microphone recognizes the voice and the camera begins recording and sending the video to the control station; otherwise, the camera is turned off. When someone shouts for help, the voice recognition activates the camera, starts recording, and sends the video to the control station. The display window was made available for users to display ad based on the user request the user need to register for the ad and the admin may accept or reject based on content and the money. The EV and mobile charging port also made available on the pole. And the personal mobile hotspot will be made available for free to all the peoples living around the city.

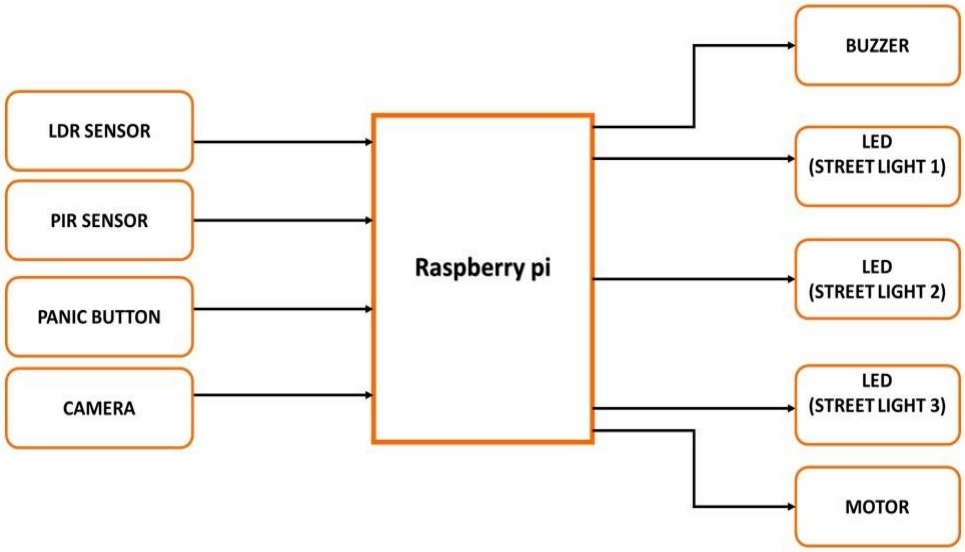

Figure 3.1: Block diagram

At the point when the LDR is identified and progressively assuming that its above 6'o clock or on the other hand on the off chance that the daylight light isn't falling on LDR the Drove will turn on . The LED will turn on when the LDR is not detected and in real time if it is below 6 am or if sunlight is falling on it. Imagine that there are ten street lights, and if someone approaches the first one, the PIR will be picked up and the entire street light will automatically turn on. The light will be turned off if PIR is not detected. The adaptive system's system architecture includes an IP65 CCTV camera, panic button, relay switch, LDR sensor, and Raspberry Pi. In this framework Raspberry pi goes about as the cerebrum of the whole framework. Raspberry Pi is connected to the LDR sensor that is used in the system. Light-dependent resistor, or LDR. The relay driver connects the relay, which acts as an automatic switch, to the Raspberry Pi. It is exceptionally solid and consequently turns ON and OFF the lights. CCTV camera is associated with the regulator which is utilized to catch the developments. The CCTV camera's recorded footage is saved on a server. When the button is pressed, the CCTV camera's current footage is sent directly to the specified cloud account, triggering an alarm at the nearby police station. When an object passes through its field of view, a PIR sensor detects its motion. An IR detector is included in the PIR sensor. Different objects produce infrared rays of various wavelengths. These beams are undetectable to the natural eye however sensors like PIRs can without much of a stretch distinguish them. The PIR and LDR sensors complement one another. PIR is in charge of turning the system ON and OFF when motion is detected, while LDR is in charge of controlling the system's intensity using an adaptive dimming technique. In order to carry out any further actions that are required, the system requires sensing a number of the pole's parameters.

4. RESULTS :

The smart pole is made with automatic street light system i.e., when a vehicle passes through its field of view, the PIR (passive infrared) sensor detects its movement. at the point when PIR sensor recognizes the vehicle development then streetlamp will gets turned ON and OFF, assuming that there is no vehicle development the elective streetlamp is turned Here and there of course. In the case of panic button is being turned on the emergency signal is put on the shaft, in the event of any crisis or risk, the individual presses the signal for an emergency response the camera which is put on the highest point of the post will be enacted and it catches the development of vehicle sends it to the control station. Through the raspberry pi cloud, recorded video will be sent to the control station. poles can give Wi-Fi availability to general society, empowering individuals to get to the web and remain associated while they are outside. Display screens that can show information, advertisements, and other promotional content can be installed on smart poles. These screens can be programmed to change colors and brightness depending on the time of day and the lighting. Shrewd posts can give EV charging stations that are fueled by sustainable power sources like sun powered chargers or wind turbines. Sensors that

can detect when a vehicle is present and adjust the charging rate based on the battery level and the time of day can be installed in these charging stations.

5. *CONCLUSION :*

The use of the Internet of Things (IoT) has successfully demonstrated how it can assist in the resolution of real-world issues and automate certain processes, thereby making their implementation faster, easier, more environmentally friendly, and energy efficient while also being cost effective. The proposed "Smart Pole System" will prove to not only greatly reduce energy consumption but also provide various other smart features and useful services to the people. The percentage values of the amount of energy that can be saved over the specified time periods are provided below to provide an idea of the anticipated power savings that can be achieved:

- A zero-energy consumption from 8 a.m. to 6 p.m., or after sunrise and before sunset, provided the weather isn't too bad.
- A consumption of 50% energy because of dimming technique used from 4am to 10am.
- A total consumption of only 30% energy due to the adaptive dimming technique [5].
- A saving of 70% energy during the night time In order to keep the cost of the entire system low, we have kept CCTV as an optional module.

The main motive behind this is that not all areas would make effective use of this module. Only areas suffering from a high crime rate would truly take advantage of this module. The reason of keeping the cost low is to make these Smart Poles available to rural areas as well. If such a system is introduced to the rural areas, the impact would be huge as implementing this would not only make them more technologically equipped but also bring them a step closer towards being at an equal standing with other "Smart Cities". Apart from saving energy, LEDs also provide a brighter illumination compared to metal halide lighting or halogen bulb lighting. This feature of LEDs is useful if the CCTV module is to be installed, as a higher quality footage can be captured. All in all, the Smart Pole System is a great upgrade to existing conventional street lighting systems.

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