Intelligent Street Light Monitoring and Control using Micro Controller

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Abstract: - A novel procedure is actualized for the street light monitoring based autonomous and practical framework. The principle point of this venture is to reduce power consumption. The goal is to plan a device which characterizes a protocol to save more power compared to conventional systems. Here we are using ARM7 controller, ARM7 utilizes less power compared to existing controller. The proposed system uses the IOT based wireless devices which allow more efficient lamps management. The designed system uses sensors to control and guarantee the optimal system parameters. The proposed system saves around 80.8% power for the outdoor street environment because of using sensors, LED lamps, IOT based communication technology.

Key Words: - Embedded systems, IR sensors, LED lamps, IOT technology

1 Introduction

Nowadays, it became essential for people work during nights and returning back to homes late nights, so safety parameter to be implemented to a great extent on highways. This can be best achieved by implementing proper lighting system on highways. The efficient monitoring of this lighting system must be taken into account. The existing system is like, the high way lights will be monitored manually which in turns is a waste of huge human power as well as precious time in addition with power wastage at the instant when proper monitoring is failed.

This drawback can be overcome by implementing a sophisticated automatic monitoring system through which high way lighting can be monitored automatically before the sun sets and they are switched off the next day morning after there is sufficient light on the roads. But the actual timings for these high way lights to be switched on are when there is absolute darkness. This project gives the best solution for electrical power wastage protection.

A. Architecture

The architecture of Intelligent Street Light Monitoring System (ISLM) is show in figure 1.

Fig. 1: ISLM Architecture

B. Existing system

The Project Embedded Automatic Street light control with LDR Interfacing using 89S52 Microcontroller is an interesting project which uses AT89S52 microcontroller as its brain. This project is very useful for commercial sign boards, advertising boards, street lights for automation lighting system. This system switches on the lights only in darkness. As it works with LDR sensor, no programming of timings and battery back-up is required. This is a simple, fit and forget system.

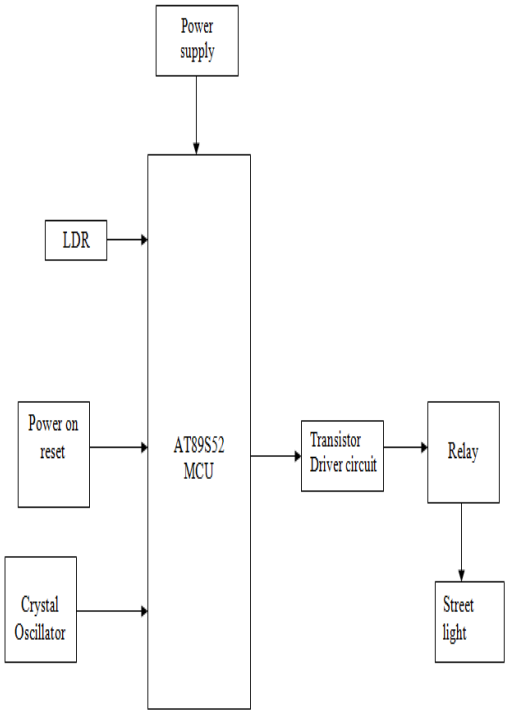


Fig. 2: MCU Architecture

Drawback: Street light will be in on condition even in the absence of vehicle/people.

2 Proposed Technology

Here in this paper, IR sensor and LDR is used for the operation of lights automatically, if it is day time the light gets OFF this operation can be performed by light sensor (LDR). In the night mode the lights will be on but in the dim condition. RTC is used to control the brightness of light at night time during the absence of people/vehicle.

IR sensors are interfaced to the controller which will detect the arrival of the vehicle and makes the lights to glow brightly at night. This is to save the power in absence of the vehicle. During day time in case of cloudy condition the light will glow brightly. This is possible by verifying time with RTC. All the information is available in the web server using IoT module connected to the controller. This can be seen either in the PC or in a mobile using internet.

The microcontroller LPC2148 is used as the heart of the project and all the sensors and interfaced to it. This project uses regulated 3.3V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectif y the ac out put of secondary of 230/12V ste p down transformer.

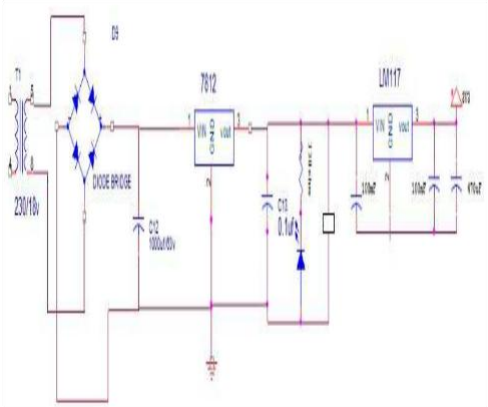


Fig. 3: Proposed methodology circuit diagram

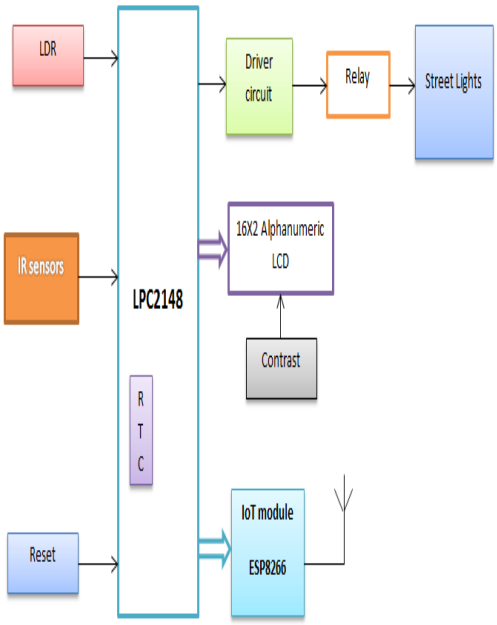


Fig. 4: LPC Transmitter Architecture

Fig. 5: LPC Receiver

LDR:

An LDR is an input transducer (sensor) which converts brightness (light) to resistance. It is made from cadmium sulphide (CdS) and the resistance decreases as the brightness of light falling on the LDR increases**.**

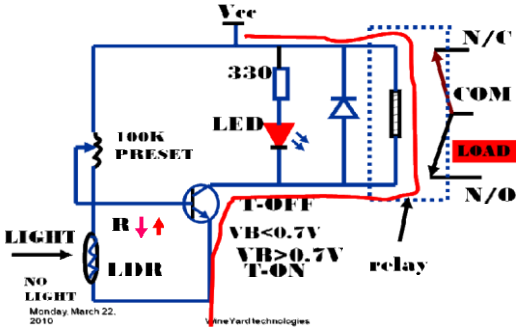


Fig. 6: LDR Architecture

IR sensor:

IR reflectance sensors contain a matched infrared transmitter and infrared receiver pair. These devices work by measuring the amount of light that is reflected into the receiver. Because the receiver also responds to ambient light, the device works best when well shielded from abient light, and when the distance between the sensor and the reflective surface is small(less than 5mm).

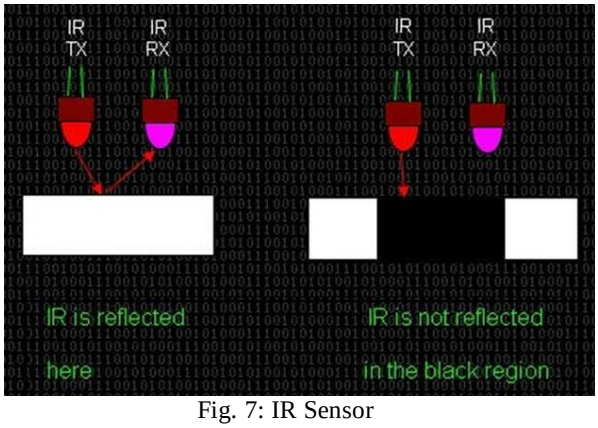


Fig. 7: IR Sensor

LPC2148:

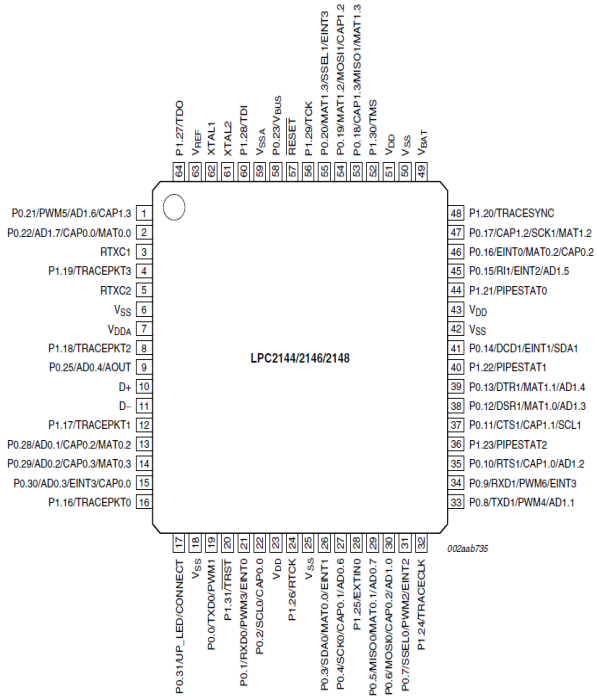


Fig. 8: Pin diagram

ARM7TDMI Processor Core:

Current low-end ARM core for applications like digital mobile phones

TDMI

T: Thumb, 16-bit compressed instruction set

D: on-chip Debug support, enabling the processor to halt in response to a debug request

M: enhanced Multiplier, yield a full 64-bit result, high performance

I: Embedded ICE hardware

Von Neumann architecture

3 Internet of Things

Internet is helping people to communicate each other using different applications. Internet of things helps the things to communicate each other using IoT module

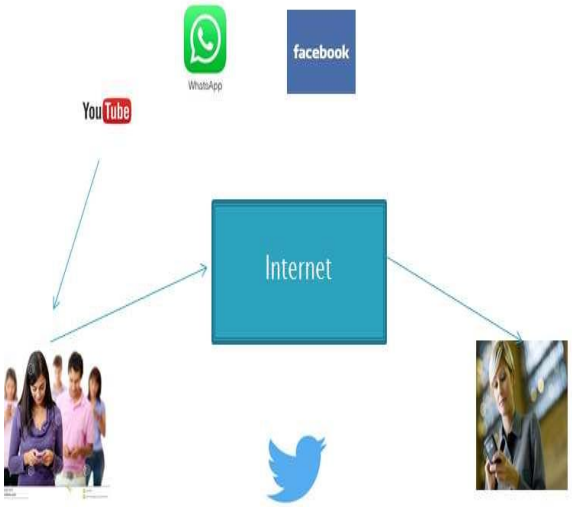


Fig. 9: IoT Interface

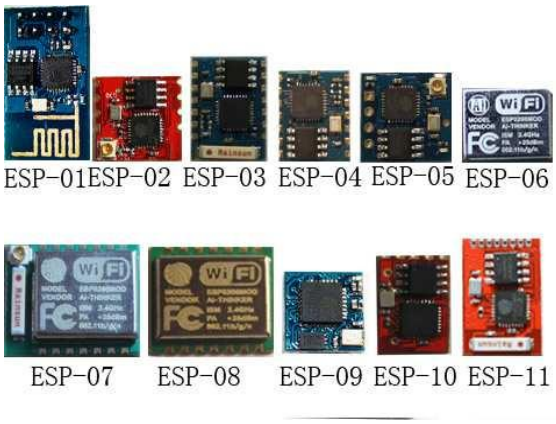
ESP8266EX

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

Fig. 10: ESP8266EX IoT

Different Modules

1. ESP8266(ESPRESSIF)
2. ESP8089
3. ESP6203



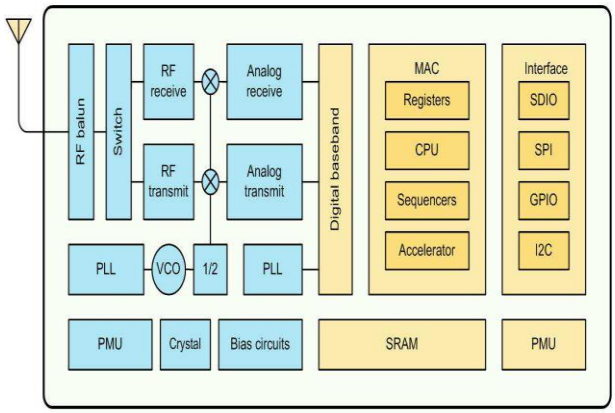


Fig. 11: Modules Architecture

Wi-Fi module

ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any micro controller-based design with simple connectivity (SPI/SDIO or I2C/UART interface). ESP8266EX is among the most integrated Wi-Fi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area.

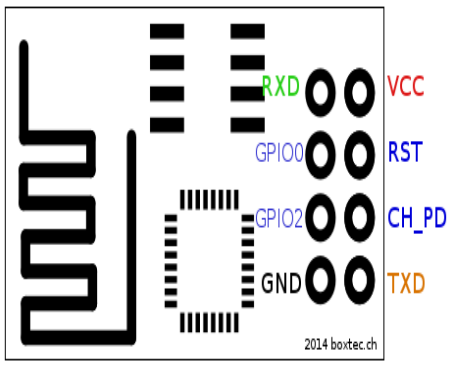


Fig. 12: Wi-Fi module

Advantages:

Highly sensitive
Fit and Forget system
Low cost and reliable circuit
Complete elimination of manpower

Applications

Industries
Home

4 Conclusion

Experimental work has been carried out using LPC2148 and the results show higher efficiency.

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