Motion Sensing Streetlight System With Error Detection

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Abstract—**A lighting system with optimized management and efficiency is presented. Presence of a person or an obstacle is detected using ultra sound sensors, which triggers the switching ON of the nearby streetlight. An error detection mechanism is also implemented so as to send the faulty light's information to a display unit. The system allows substantial energy savings with increased performance and maintainability by reducing manual control and supervision.**

Keywords—Streetlight, Error Detection, Motion Sensing

I. INTRODUCTION

The increasing importance for saving power and proper maintenance pushes a need to develop new techniques and technologies which permit more effective management. Our work aims at making an intelligent street lighting system, which uses high power LEDs. The management system is implemented by using fault detector circuit to gather the faulty state of the lamp and then transferring the data to the micro controller. The microcontroller then sends the appropriate data to a display unit.

II. WORKING PRINCIPLE

Automatic Street Light Control System is a simple yet powerful concept. The entire system will run only when sunlight goes below the visible region of our eyes and the system will be off when the sunlight comes visible to our eyes. This is sensed via Light Dependent Resistor (LDR). Streetlights will automatically be switched ON when it detects a person in its detection range and they will be switched OFF whenever the person moves out of the detection range. This detection range is set using motion sensing detectors like IR, PIR etc. Here, ultrasound sensor HC-SR04 is utilized for the same purpose. Each street lamp will be monitored using a fault detecting circuit whenever the corresponding sensor senses a motion. If the circuit detects any faulty lamp it sends the information to the micro controller which can be utilized for efficient and quick management of the system.

III. COMPONENTS UTILISED

A. MSP430G2553 Micro Controller

The MSP430 is generally used for low powered embedded devices. The current drawn in idle mode is less than 1 μA, with the top CPU speed being 25 MHz. It can be throttled back for lower power consumption. The MSP430 also uses six different low-power modes, which can disable unneeded clocks and CPU. Additionally, it is capable of wake-up times below 1 microsecond, allowing the microcontroller to stay in sleep mode longer, minimizing its average current consumption. The device comes in a variety of configurations featuring a number of peripherals including internal oscillator, timer including PWM, watchdog, UART, SPI, I²C, 10/ 12/ 14/ 16/ 24 - bit ADCs, comparators (that can be used with the timers to do simple ADC), on-chip op-amps for signal conditioning, 12-bit DAC and DMA for ADC results.

B. Ultra Sound sensor HC-SR04

The HC-SR04 Ultrasonic (US) sensor is an ultrasonic transducer that comes with 4 pin interface named as Vcc, Trigger, Echo, and Ground. It is very useful for accurate distance measurement of the target object and mainly works on the sound waves. When the module is connected to 5V and initialized, it starts transmitting the sound waves which then travel through the air and hit the required object. These waves hit and bounce back from the object and then collected by the receiver of the module. When the echo pin turns 0, we infer that an object is detected.

### C. Light Dependent Resistor - LDR

Light sensor will measure the external light intensity and if the external light intensity falls below a threshold level the entire system will be switched on. This is to make the street lamps to be switched ON only in the night time and to remain OFF in the day time. In this model we used a light dependent resistor which varies its resistance based on the illumination of light that falls on it. The range of the resistance is 0Ω to 25kΩ. LDR possesses high reliability, less power consumption and wide ambient temperature.

D. LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. It has two registers, namely, Command

and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

IV. FLOW CHART
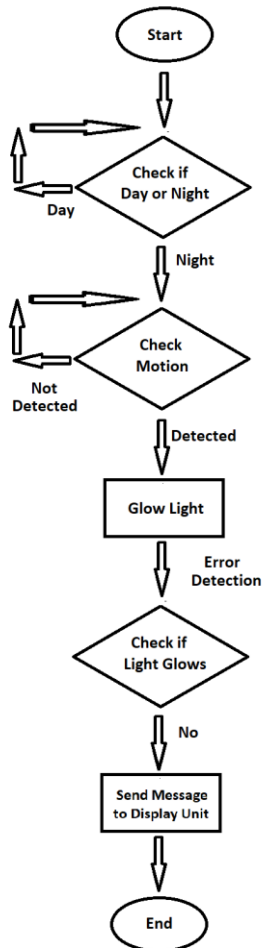
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VI. DEMONSTRATION IMAGE
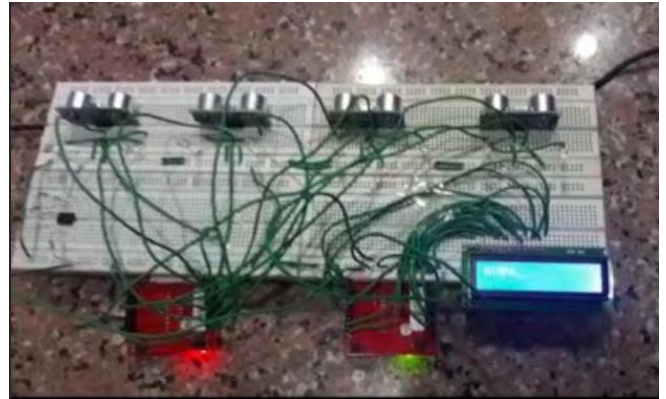
REFERENCES

[1] V.Pavani, G. Thirumala Vasu; "Street Lighting System with Fault Detection Using ARM7," Sustainable Energy Technologies, International Journal of Emerging Engineering Research and Technology Volume 2, Issue 4, July 2014, PP 302-305 ISSN 2349-4395 (Print) & ISSN 2349-4409 (Online)

[2] Design of new intelligent street light control system. Wu YUE; Shi Changhong; Zhang Xianghong; Yang Wei Control and Automation (ICCA), 2010 8th IEEE International Conference on. Year: 2010.