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IoT Based Street Light Controlling

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Abstract –*This project aims to monitoring and controlling the street lights. By doing this here designed a monitoring and controlling system with raspberry pi kit. Which controls the light operations according to the sun light, for this we have LDR sensors which detect the sun light and automatically control the light operations. By monitoring we can identify the light operations and weather the light is working or not. By doing this project we can save the power.*

Key Words: LDR sensor, ADC module, LED's, Raspberry Pi.

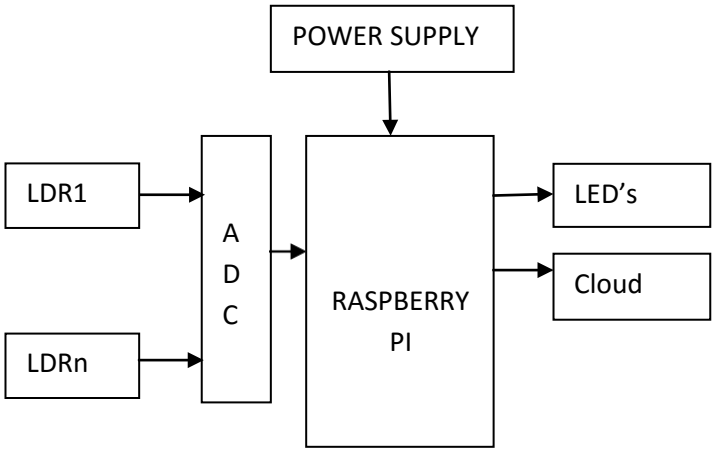
1.INTRODUCTION

Streetlightingprovidesanumberofimportantbenefits.Itis used to promote security and to increase the quality of life byartificiallyextendingthehoursinwhichitislightsothat activity can take place. Street lights also improve safety of drivers,pedestrians.Butduetobusylifestyleofhumans, switchingoperationsarenotcarriednotontimeandahuge amountofelectricityisbeingwasted.Aslightingcanaccount 10-38%oftotalenergybillintypicalcitiesworldwide.Also the accident rate is also increasing. Our project aims to overcome these situations by automatic street light controlling system. Automatic Street Light controlling systemisasimpleandpowerfulconcept,whichusestheLDR sensor to sense the amount of sunlight in the environment. With the help of these LDR values street lights switching ON/OFF will be done automatically. It automatically switches ON the light when the sunlight goes below the visibleregionofoureyes.ItautomaticallyswitchesOFFthe light under illumination by sunlight. Initially operation of street lights was done manually. This caused to wastage of energy, as the street lights were not switched OFF even when there is ample of sunlight and not turned on even when sun sets. Later on timer circuits came into existence. Even these did not provide the solution, as due to the seasonal changes the switching of street lights are not carried outproperly.

1.1 SYSTEM OVERVIEW

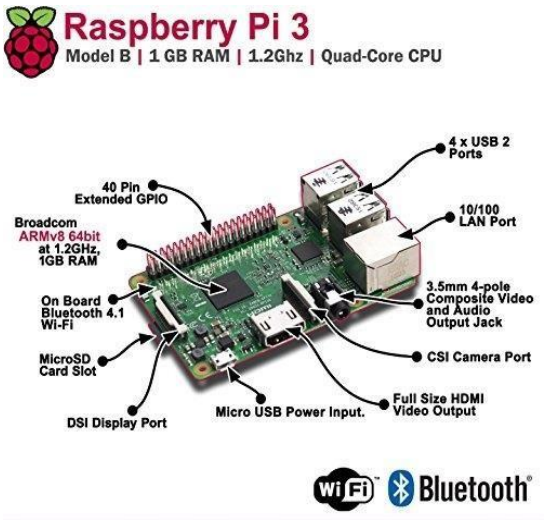
The project consists of four major components; Raspberry Pi, LDR Sensor, ADC module, LED's . The block diagram is shown below:

BLOCK DIABGRAM:



a) RaspberryPi:

TheRaspberryPiisaseriesofsmallsingle-boardcomputers. It is the main element in the field of internet of things. It provides access to internet and hence the connection of automationsystemwithremotelocationcontrollingdevice becomes possible. Raspberry Pi is available in various versions. Here in our project we are using Raspberry Pi 3 modelB.Ithasquad-coreARMCortex-A53CPUof900MHz, andRAMof1GB.Italsohas40GPIOpins,FULLHDMIport,4 USB ports, Ethernet port, 3.5mm audio jack, video camera interface (CSI), the Display interface (DSI), and Micro SD cardslot.



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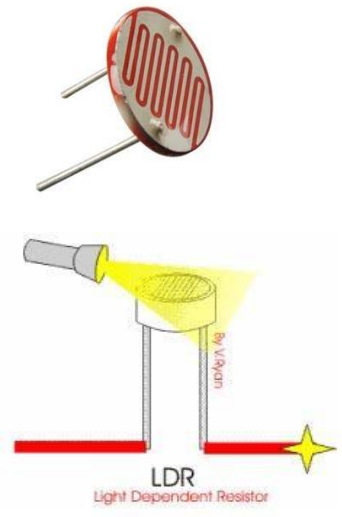
b) LDRSensor:

LDRisdevicewhosesensitivitydependsupontheintensity oflightfallingonit.WhenthelightfallingonLDRincreases theLDRresistancedecreases,whilethelight fallingonLDR decreasesresistancewillincreases.Inthetimeofdarkness, theresistanceofLDRisintherangeofmegaohms,whilein the presence of light it decreases by few hundredohms.



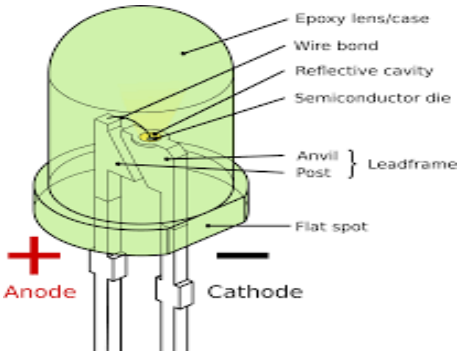
c) ADC module:

AsRaspberryPidoesnotcontainanyanalogpins,wehavetointerfa ceAnalogtoDigitalConverter(ADC)withRaspberry Pi. The MCP3008 is a low cost 8-channel 10 bit analog to digitalconverter.TheprecisionofthisADCissimilartothat ofanArduinoUno.ADCcombineshighperformanceandlow power consumption in a small package, making it ideal for embedded control applications. The MCP3008 features a successiveapproximationregister(SAR)architectureandan industry-standard SPI serial interface, allowing 10-bit ADC capability to be added to any PIC microcontroller. The MCP3008features200ksamples/second,8inputchannels, lowpowerconsumption,andisavailablein16-pinPDIPand SOICpackages.

Applications for the MCP3008 include data acquisition, instrumentation and measurement, multi-channel data loggers, motor control, robotics, industrial automation, smart sensors and home medical appliances.

d) LED:

InthissystemLED'sareusedasstreetlights.Alight-emitting diode is a two lead semiconductor light source. It is a p-n junctiondiodethatemitslightwhenactivated.Thecolorof the light is determined by the energy band gap of the semiconductor.



SOFTWARE USED

a) Python:

Pythonisaninterpretedhigh-levelprogramminglanguage. Python has a design philosophy that emphasizes code readability,andasyntaxthatallowsprogrammerstoexpress concepts in fewer lines of code, notably using significant white space. Python features a dynamic system and automatic memorymanagement.

b) ThingSpeak:

ThingSpeakisanopensourceInternetofThingsapplication and API to store and retrieve data from things using the HTTP protocol over the internet or via a LAN. ThingSpeak enablesthecreationofsensorloggingapplications,location tracking applications. MAT Lab supports for ThingSpeak. ThingSpeak has close relationship withMathworks.

2. GraphPlots: TheoutputsofLED'sareshownbelow

Chart1: Street 1

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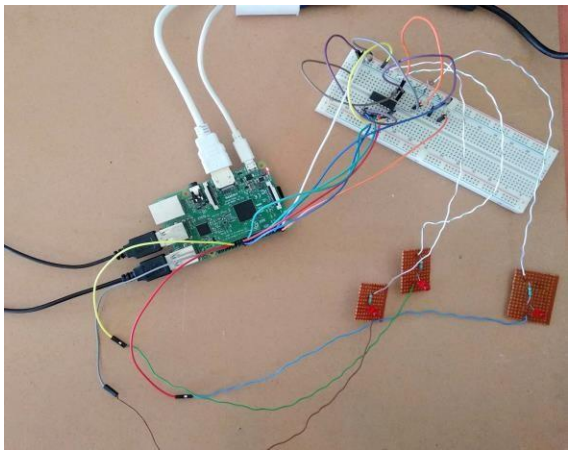
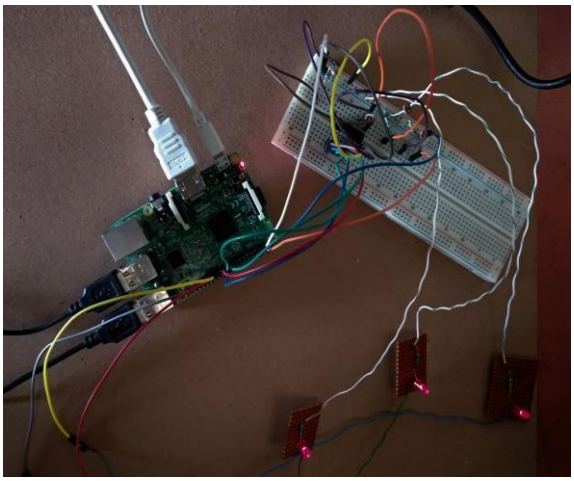
Chart2:Street2

Chart3:Street3

The LDR sensor is connected to ADC module. The digital output of ADC is given to Raspberry PI and power supplyis given. The raspberry pi reads the values from LDR sensor andswitchon/offtheled's.Ifampleoflightispresentinthe environment, means if ADC values reach threshold value thenLED'swillswitchedOFFautomaticallyandifitisdark, meansADCvaluesarebelowthethresholdlevelthenLED's will switch ON automatically through raspberry pi. This information is posted to the cloudserver.



LED's OFF



LED's ON

3. CONCLUSIONS

This project eliminates the power wastage and simply can monitor, operate the light functions. The automatic switching operations observed, using the developed control circuits found to be very efficient and maintenance cost is very less.By this project can save a large amount of electric power which is wasted in conventional street lights.

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