

SMART CITY USING IOT

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ABSTRACT

Air and sound pollution is increasing day by day. Also parking problem and corridor light management is one of the needed things now a days. Apart from this there are many applications related to agriculture where automation is required. In short now it is need of the society to move towards smart functioning in short smart city. This paper include solution for monitoring same using raspberry pi. In a number of society that the parking and corridoor light is one of the huge expenses in a city. Currently a manual system is used where the light will be made to switched ON/OFF. Irrigation system use for measuring moisture of soil which help to increase production of agriculture. Water monitoring system help to measure quality of water and temperature.

Keyword: *Air and Sound, Energy Conservation, GSM, IOT, LDR, Monitoring, Raspberry Pi, Relay, Soil Moisture Sensor, Wi-Fi Model.*

INTRODUCTION:

Internet of Things (IOT) is an important research area which allows a strong connection to communicate between the physical objects through internet connectivity. The Internet of things is the interconnection between the physical objects such as cars, buildings, other vehicles, kitchen appliances and other embedded devices with electronics, software, sensors and actuators that enables these objects to send and receive data over a network without the requirement of human-to- human or human-to-computer interaction. Internet of things device is a device stand-alone internet connected device that can be remotely controlled from other location [1].

Air and sound pollution is an increasing problem these days. It is important to screen the air and sound contamination levels to guarantee a solid and safe condition of environment. The environmental problems like the expansion in modern plants and framework have affected the prerequisite of keen checking framework. In recent times, it is simpler to shape correspondence among people and gadgets. The environmental problems like the expansion in modern plants and framework have affected the prerequisite of keen checking framework. In recent times, it is simpler to shape correspondence among people and gadgets. estimating procedure exact and easier than moving to [2].

In a number of society that the parking and corridoor light is one of the huge expenses in a city. Currently a manual system is used where the light will be made to switched ON/OFF. i.e the light will be made to switch ON in the evening and switched OFF in the morning. Hence there is a lot of wastage of energy between the ON/OFF. This is one of the major causes of shifting to the automatic system, since there is less wastage of power and thus saving a lot of monetary expenses.

Agriculture plays major role in the economy of the country. More than 70% of Indian population relies on agriculture for their sustenance. As the contribution of agriculture to Gross Domestic product is declining nowadays, we are in urge to increase crop productivity with efficient and effective water usage. In agriculture irrigation is the important factor as the monsoon rainfalls are unpredictable and uncertain. Agriculture in the face of water scarcity has been a big challenge. Nowadays, water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the water quality parameters in real time. The water quality parameters pH measures the concentration of hydrogen ions. It shows the water is acidic or alkaline. Pure water has 7pH value, less than 7pH has acidic, more than 7pH has alkaline. The range of pH is 0-14 pH. For drinking purpose it should be 6.5-8.5pH. Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity higher the risk of diarrhoea, collera. Lower the turbidity then the water is clean. Temperature sensor measures how the water is, hot or cold [3].

HARDWARE IMPLEMENTATION

BLOCK DIAGRAM -

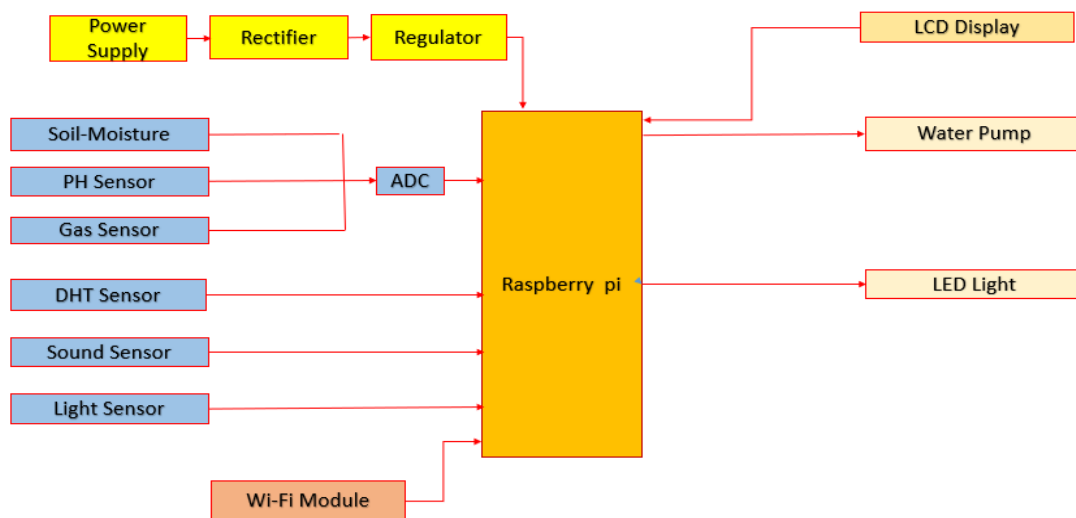


Fig 1. Block diagram of proposed system

Circuit Diagram

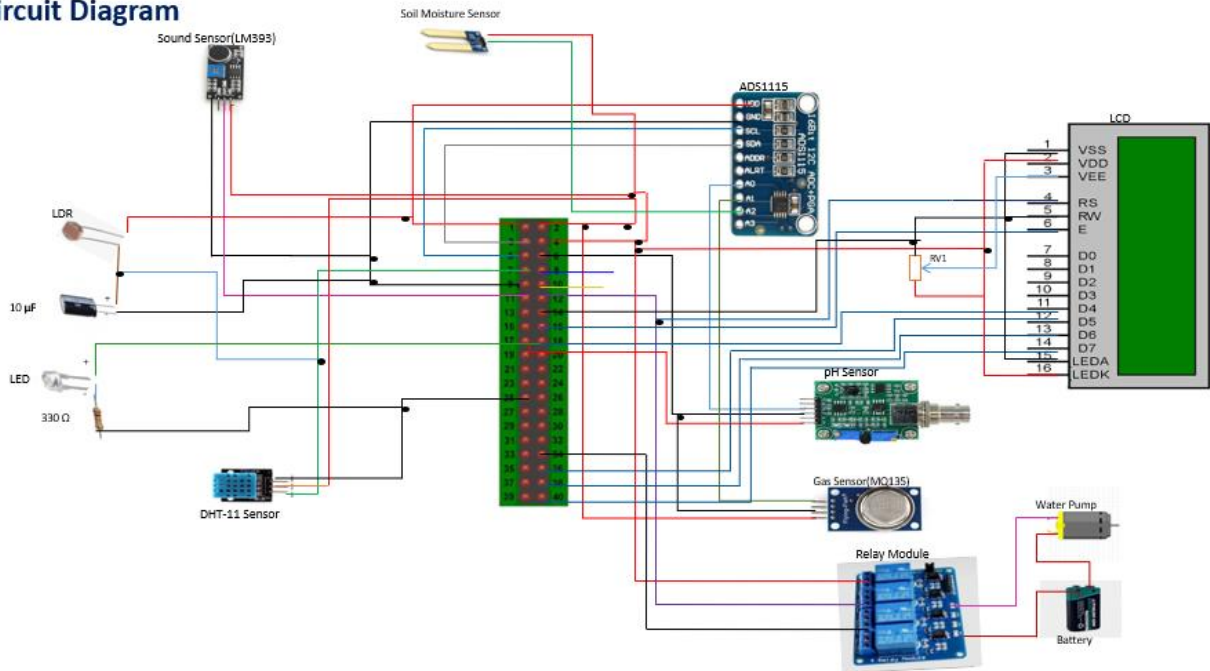


Fig 2. Circuit diagram

1. Raspberry Pi

Raspberry pi is based on Broadcom system on a chip(SoC), which consists of on-chip ARM compatible central processing mposite video output, a3.5 mm audio phone jack and one and four USB slots. It has on board memory range from 256 MB to 1 GBRAM. In raspberry pi operating system is stored in SD cards. Through number of GPIO pins Lower level output is provided that support counit (CPU) and an on chip GPU(Graphics Processing Unit). Raspberry pi has CPU speed which ranges from 700 MHz to1.2 GHz. Most boards have HDMI common protocols like I²C. Pi 3 and Pi Zero W have on board Bluetooth and WI-FI 802.11n.[5]

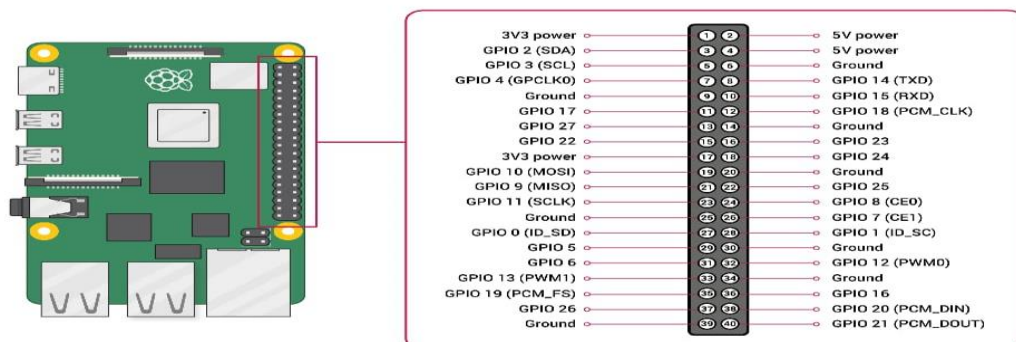


Fig 3. Raspberry Pi with pin diagram

2. Sensors

2.1 LDR

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials having high resistance. A light dependent resistor works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity (Hence resistivity) reduces when light is absorbed by the material.

2.2 pH Sensor

The pH of a solution is the measure of the acidity or alkalinity of that solution. The pH scale is a logarithmic scale whose range is from 0-14 with a neutral point being 7. Values above 7 indicate a basic or alkaline solution and values below 7 would indicate an acidic solution. It operates on 5V power supply and it is easy to interface with arduino. The normal range of pH is 6 to 8.5.[6]

2.3 DHT-11 Sensors

The **DHT11** is a commonly used **Temperature and humidity sensor**. The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. The sensor is also factory calibrated and hence easy to interface with other microcontrollers. The sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of $\pm 1^\circ\text{C}$ and $\pm 1\%$. The DHT11 Sensor is factory calibrated and outputs serial data and hence it is highly easy to set it up..[7]

2.4 Soil moisture Sensor

The soil moisture sensor consists of two probes that are used to detect the moisture of the soil. The moisture sensor probes are coated with immersion gold that protects Nickel from oxidation. These two probes are used to pass the current through the soil and then the sensor reads the resistance to get the moisture value.[8]

2.5 Gas sensor (MQ135)

The MQ-135 Gas sensors are used in air quality control equipments and are suitable for detecting or measuring of NH₃, NO_x, Alcohol, Benzene, Smoke, CO₂. The MQ135 sensor module comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. If you need to measure the gases in PPM the analog pin need to be used. The analog pin is TTL driven and works on 5V and so can be used with most common microcontrollers.

2.6 Sound Sensor (LM393)

Sound Detection Sensor Module consists of four pins i.e. VCC, GND, DO, AO. Digital out pin is connected to the output pin of LM393 comparator IC while the Analog pin is connected to Microphone. The internal Circuit diagram of the Sound Detection Sensor Module is given below.

3. Wi-Fi Module - ESP8266

Espressif Systems "Smart Connectivity Platform (ESCP) of high performance wireless SOCs, for mobile platform designers, provides unsurpassed ability to embed Wi-Fi capabilities within other systems, at the lowest cost with the greatest functionality. ESP8266 offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any microcontrollerbased design with simple connectivity through UART interface or the CPU AHB bridge interface. The **ESP8266 module** works with 3.3V only, anything more than 3.7V would kill the module hence be cautions with your circuits. The best way to program an **ESP-01** is by using the FTDI board that supports 3.3V programming.[10]

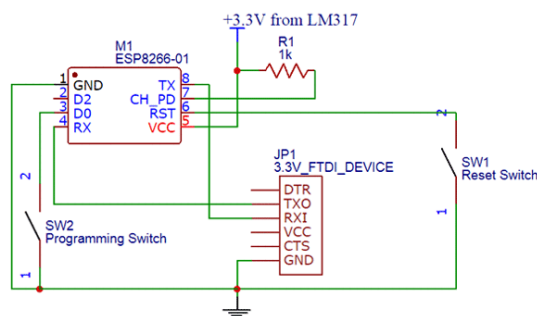


Fig. 4. ESP8266 circuit Diagram

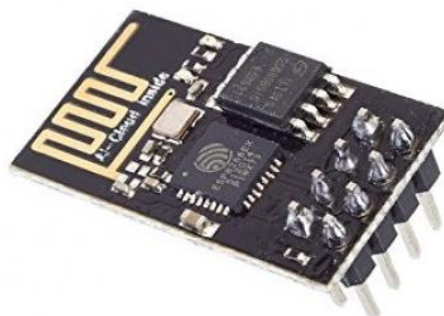


Fig. 5. Esp8266 WiFi module

SOFTWARE REQUIREMENT

1) **Raspberry pi OS:** Normally a raspberry pi uses rasping as an operating system it also uses a Debian based Linux operating system. A number of third parties operating systems is also available which include Snappy Ubuntu Core, Ubuntu MATE, and Windows 10 IoT Core.

2) **Python:** *Python* is an extensively used general purpose, high-level, interpreted, dynamic programming language. It's a scripting language which gives code readability, and its syntax allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java.

CONCLUSION

This project help to develop Smart city which reduces human effort, save electricity by using light control based on IoT. water monitoring system provide quality water to people and save people from cholera and other water related disease. Also help farmer for their great agriculture production with help of irrigation system. Monitor air and noise pollution and help people to stay healthy and make people life more easier and digital.

REFERENCES

Research paper

- [1] Ms. Snehal Deshmukh, Dr. S. S. Sonavane, "Security Protocols for the internet of Things: A Survey", 2017, 978-1-5090-5913-3/17/\$31.00_c 2017 IEEE. DOI:10.1109/ICNETS2.2017.8067900
- [2] Elizabeth Basil; S.D. Sawant, .IoT based Traffic Light Control System using Raspberry Pi, **Published in:** 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)10.1109/ICECDS.2017.8389604
- [3] D. Ganeshkumar , V. Parimala , S. Santhoshkumar , T. Vignesh, M. Surendar, 2020, Air and Sound Pollution Monitoring System using Cloud Computing, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) Volume 09, Issue 06 (June 2020).
- [4] Ankit Maslekar, Aparna K 2, Mamatha K 3, Shivakumara T , Smart Lighting System using Raspberry PI, International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 4, Issue 7, July 2015
- [5] Vaishnavi V. Daigavane and Dr. M.A Gaikwad ,Water Quality Monitoring System Based on IOT, Advances in Wireless and Mobile Communications. ISSN 0973-6972 Volume 10, Number 5 (2017), pp. 1107-1116 © Research India Publications <http://www.ripublication.com>

- [6] Kumar Saha¹, Sachet Sircar², Priyasha Chatterjee³, Souvik Dutta⁴, Anwesha Mitra⁴, Aiswarya Chatterjee⁴, Soumyo Priyo Chattopadhyay¹, Himadri Nath Saha¹, A Raspberry Pi Controlled Cloud Based Air and Sound Pollution Monitoring System with Temperature and Humidity Sensing , 978-1-5386-4649-6/18/\$31.00 ©2018 IEEE.
- [7] Gowthamy.J, ChintaRohith Reddy, PijushMeher, SaranshShrivastava, Guddu Kumar, “Smart Water Monitoring System using Io”, International Research Journal of Engineering and Technology (IRJET), © 2018.
- [8] Dr. J. Jegathesh Amalraj, S. Banumathi, J. Jereena John ,A Study On Smart Irrigation Systems For Agriculture Using IoT, Dr. J. Jegathesh Amalraj, S. Banumathi, J. Jereena John, International Journal of Scientific & Technology Research Volume 8, Issue 12, December 2019
- [9] Arif Gori¹ , Manglesh Singh² , Ojas Thanawala³ , Anupam Vishwakarma⁴ , Prof. Ashfaque Shaikh, Smart Irrigation System using IOT, International Journal of Advanced Research in Computer and Communication Engineering ISO 3297:2007 Certified Vol. 6, Issue 9, September 2017
- [10] Mrs. Snehal Deshmukh-Bhosale, Dr. S. S. Sonavane, “Detection of Security Attack in IoT using Received Signal Strength Indicator”, © 2019, Web of Science; Helix E-ISSN: 2319-5592; P-ISSN: 2277-3495, DOI 10.29042/2019-5042-5045.

Datasheets

- [1] ESP2866
[2] Raspberry Pi