

Smart Automation using IoT

Nagaraj M.S, Naveen Kumar E, Karthik D M, Dinesh Kumar, Ravi Rayappa
 Department of ECE, Jain institute of Technology Davangere, India

Abstract: This paper presents the overall design which includes- Home Automation System, smart agriculture system and smart street light system with wireless system. The Home Automation program focuses on the development of a home-based IoT system that can control various components via the Internet. Explains the creation of a smart control firmware that can be effectively minimized human interaction to maintain integrity on complete home electrical devices. The Internet of Things (IoT) technology has brought about change in all areas of the average person's life by making everything smarter and smarter. IoT refers to a network of objects which make a self-configuring network. In the development of equipment based on Intelligent Smart Farming IoT is a daily transformation of agricultural production not only by improving it but also making it less expensive and reducing waste. Purpose / objective of Smart Farming is to proposing a Novel Smart IoT based Agriculture that helps farmers access Live Data (Temperature, Soil Moisture) to better monitor the environment which will help them to produce smart farming and increase their overall yield and quality of products. Proposed agricultural development including Arduino Technology, Breadboard mixed with various sensors and live data feeds can be found online at Thigspeak.com. Smart Street light system accomplishes using Arduino microcontroller and sensors that will control the electricity based on day and night detection. The advantage of this proposed project is that it can reduce wastage of unused electricity, life time of the streetlights gets enhance because the lights stay ON only during the night-time, and also helps to increase safety measurements. We are confident that the proposed concept will be beneficial to future microcontroller and sensor systems etc.

I. INTRODUCTION

Internet of Things (IoT) concept is where each device is assigned an IP address and with that IP address anyone can make that device visible online. Digital devices are provided with unique identifiers which are able to send data over the network. It basically began with the term "Computer Internet." Research has predicted a dramatic increase in the number of "items" or devices that will be connected to the Internet. The resulting network is called the "Internet of Things" (IoT).

The term "home automation" has been around for quite some time. The terms "Smart Home" and "Smart Home" are used to communicate the concept of network functionality within a home. Home Automation Systems integrates centralized control and monitoring of lighting, security systems, and other electrical appliances and in-house systems. The Home Automation System enables energy efficiency, improves security systems, and certainly the comfort and ease of users. In the current growing market, the Home Automation System is gaining popularity and attracting the interests of many users. Agriculture is one of the vital domain where IoT-based research is in progress and new products are emerging to make the actions smarter yet efficient in order

to improve yield. Globally, the agriculture industry is regarded as the most important for guaranteeing food security. When it comes to Indian farmers, they are currently in a lot of problems and are at a disadvantage in terms of farm size, technology, trade, government regulations, climate conditions, and so on. Agricultural production necessitates numerous operations, such as soil and plant monitoring, as well as environmental monitoring, such as moisture and temperature. Traditional lighting systems have just two options: ON and OFF, which is inefficient because such operations result in power loss owing to continued operation at maximum voltage. As a result, one of the most visible power losses is waste from street lights, although automation allows for numerous innovative energy and money-saving ways. In the past, it was proposed to control lighting systems utilizing Light Dependent Resistor (LDR) and Arduino combined. The street lights detect day and night on the street and turn on automatically.

II. PROBLEM STATEMENT

Household automation refers to the use of IoT technologies to control home appliances. As a result of its security, energy efficiency, and convenience of use, home automation is becoming more popular. It also provides a web browser-based remote interface for controlling and monitoring home appliances. In a smart farming system, an effective decision support system is feasible thanks to a wireless sensor network that manages various farm activities and provides useful agricultural information. Information on soil moisture, temperature, and humidity content will be provided. The water level is rising due to the weather. Farmers are frequently distracted, which is detrimental to agriculture. Farmers use that mobile application to manage water levels in both automatic and manual modes. It will make farmers more comfortable. Previously, street lights were turned on and off manually, which was time consuming and required manpower. Without human interaction, the new smart street light system turns ON/OFF- the street lights this recognizes both day and night. When compared to the previous system, it will be simpler. Even during the day, most cities have street lights on. Due to these circumstances, a significant amount of energy/power is squandered unnecessarily.

III. OBJECTIVES

- Agriculture is the back bone of Indian economy. 58% of rural households depend on agriculture as a means of bread and butter.
- The paper elaborates the agricultural system innovation that allows farmers to obtain soil moisture, level of moisture content, and the water quality for effectively using the environment to

increase productivity and to obtain products of high quality.

- The proposed smart farming combined with Arduino technology with a various types of sensors.
- Household smartness is achieved through the use of devices that can be utilized to operate household equipment remotely. This connects the system to the internet, allowing all household appliances to be connected and operated remotely.
- The automated streetlight control system with IoT saves energy by minimizing electrical waste and labor.
- The Smart Street Lighting System is a simple and practical system for automatically switching on and off-street lights. The lights turn on automatically when the sun's intensity diminishes. The lights are turned off by monitoring the quantity of luminous sunlight during the day with an LDR (Light dependent resistor).

IV. MOTIVATION

The street lights are turned on and off depending on the amount of sunshine available. This work is done by an LDR sensor, which monitors light in the same way that our eyes do. The technology detects whether or not there is a need for light. When the darkness approaches a predetermined level, street lights are automatically turned on; otherwise, they are turned off.

Today's smart home automation places a greater emphasis on smart living, sustainability, and security. Our smart house is environmentally friendly and ensures that we are not wasting electricity. Furthermore, the smart home can deter burglars by sounding an alarm or sending a warning to us via a Smartphone-connected application. Automated lights, remote mobile control, remote video surveillance, and receiving mobile, email, and text notifications are all current smart home automation trends.

The purpose of a intelligent agriculture module is to decrease the use of water while increasing productivity and precision on small agricultural farms. Agriculture is the backbone of certain towns and most villages in the majority of countries, which adds to this incentive. Furthermore, agriculture is the primary source of revenue in certain countries. Taking into account the aforementioned elements, the farm is divided into areas; the suggested system uses wireless sensor networks and the internet of things to monitor soil moisture, humidity, and temperature in the various regions and provides a report to the end user. We hope that by using the aforementioned data, the end user (farmer) will be able to better plan for the cultivation of the farm ,followed by harvesting, irrigation, and well as for the fertilization.

V. LITERATURE SURVEY

[1] Tushar Churasia and Prashant Kumar Jain

“Enhance Smart Home Automation System based on Internet of Things” The function reduces the text encryption

and emphasizes on authentication and automation of intelligent home equipments by reading.

[2] Anand Nayyar and Er. Vikram Puri November 2016

“Smart Agriculture: IOT based smart sensors agriculture the purpose of this paper is to have a novel intelligent IOT-based agriculture that will help the farmers in getting the real-time data (like temperature, soil moisture etc.) for efficient environmental monitoring, allowing them to undertake smart farming and improve overall yield and product quality.

[3] Mahesh boda, Raju Ath, Shivani chettukindi.

“Internet of Things-based Smart Street lighting system” The goal of an IoT-based smart street light system is to conserve energy by decreasing both electrical waste and manpower. The saved energy can be used for a variety of reasons, including residential, commercial, and industrial. The LDR sensor is used to accomplish this. The LDR sensor is used to turn on and off the street light based on the ambient light intensity. It's a light/dark switch along with a relay at the output point. After reading the LDR value, Wi-Fi module ESP8266 may do the switching. The status of the street light (ON/OFF) may be seen via the internet at any time and from any location. It provides exceptional long-term stability and high reliability. This project uses a programmed NodeMcu board to provide the appropriate light intensity at different times. When compared to the existing system, the proposed work has outperformed it.

VI. BLOCK DIAGRAM

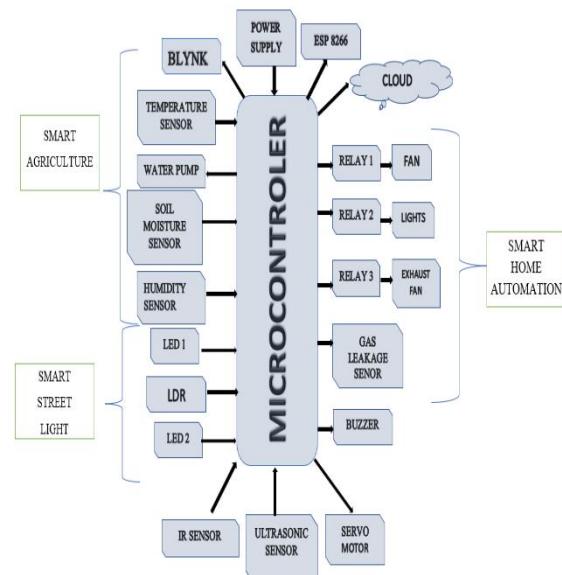


FIG 1: BLOCK DIAGARM

As you can see from the block diagram above, we employed a central controller unit called a microcontroller to control the functions of embedded systems. Many sensors were used, and the microcontroller was given a maximum 5V

power supply. The Arduino board (node mcu) receives power from the power source. It generates results in three different areas: home automation, agriculture, and street lighting. The water level, humidity, and moisture levels are checked / monitored in the agriculture industry. It notifies the user of the levels by SMS. If the water level falls below a certain threshold, sensors activate the water pump.

This is also found in IoT, which displays humidity, moisture, with date and time based on each minute. We utilized LDR for checking the day and night difference in the Automatic street light sector, and triggering the LDR ON/OFF status when the LDR is activated during night, the street lights will be automatically turned ON, and while in the day time, the street lights will be turned off. We used ESP8266 in the intelligent house automation area to control home appliances such as fans and lights, and we also used gas leakage sensors in the kitchen to detect gas leakage. If there is a gas leakage, it detects gas automatically and turns on the exhaust fan to exhaust gas inside the room.

VII. HARDWARE REQUIREMENTS:

- Microcontroller board
- IR Sensor
- ESP 8266
- LDR
- Soil moisture sensor
- Humidity sensor
- Ultrasonic sensor
- Gas leakage sensor
- Led
- Fan
- Power supply
- Water pump, Servo motor
- Relay

SOFTWARE REQUIREMENTS:

- Arduino IDE
- Thingspeak Tool
- Arduino C
- IoT Cloud
- Blink application

VIII. ADVANTAGES

- Reduces manpower and improves productivity by avoiding traditional farming methods.
- It helps in proper management of system by being in one place.
- Enhances the efficiency of energy by decreasing the rate of consumption.
- Appliances functionality will increase.
- Useful for farmers & greenhouse owners.
- Street lights will be automated.
- Wireless communication is also supported.

IX. DISADVANTAGES

- The user can't handle the machines/devices properly if he possesses less technical knowledge which will lead to the damage in the system.
- The installation cost is a bit high.

- This model fail to extend its support in remote regions if the internet connectivity is poor.

X. RESULTS

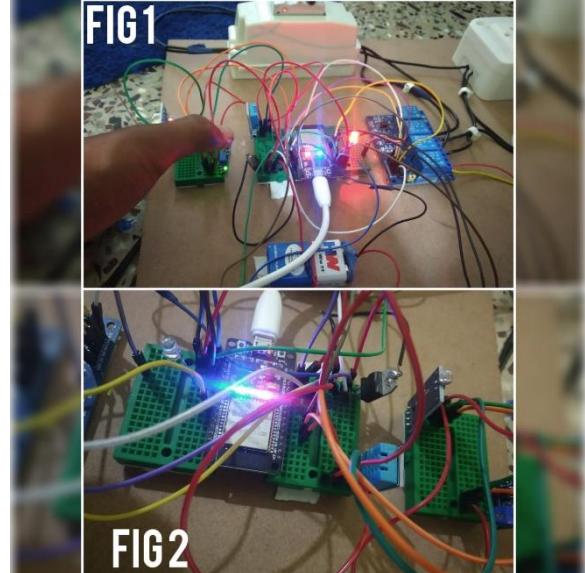


FIG 1: SHOWS THE LIGHT ON CONDITION DURING THE NIGHT TIME
 FIG 2: SHOWS THE LIGHT IN OFF CONDITION DURING THE DAY TIME

Here the ldr sensor is used to detect the light for day / night condition when ldr triggers that is 0 the street light will in off condition only .when the ldr value is 1 that is night time the street light will in on condition.

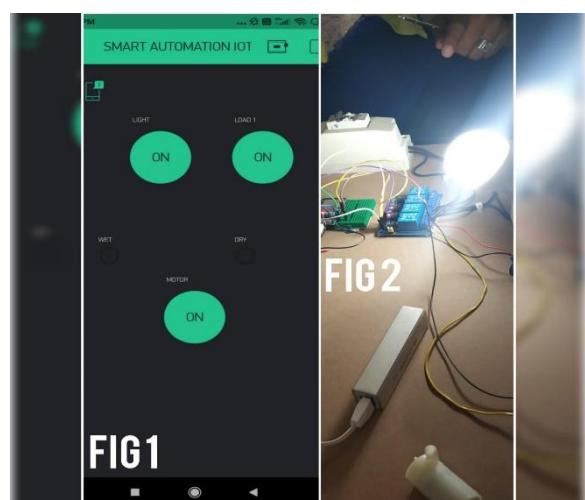


FIG 1: SHOWS THE USE OF BLYNK APP TO CONTROL THE LOADS [LIGHT, FAN]
 FIG 2: SHOWS THE LIGHT IN ON CONDITION.

Here we use the blynk application to turn on and off the loads and to get a notification when the soil is dry to turn on the motor.

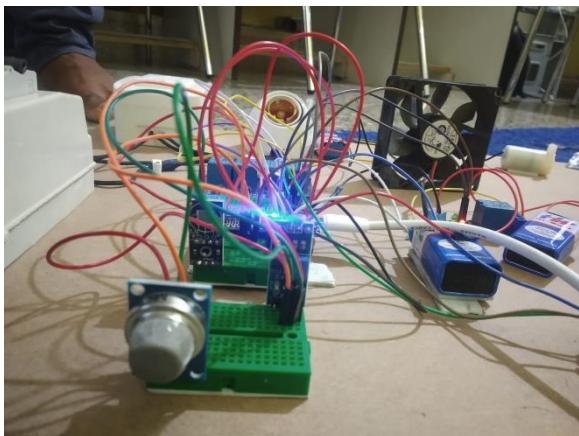


FIG 4: SHOWS THE USE OF LPG GAS SENSOR AND USE OF EXHAUST FAN

Here we use the MQ5 sensor to detect the gas when it detects the gas automatically the exhaust fan will on.

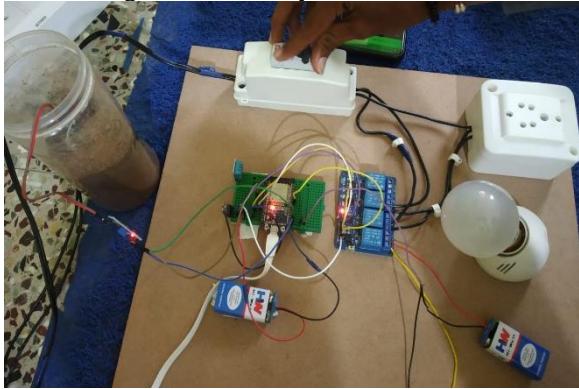


FIG 5: USE OF SOIL MOISTURE SENSOR.

When the soil is in dry condition it will turns the motor on and when the soil is in wet condition the motor will in off condition only.

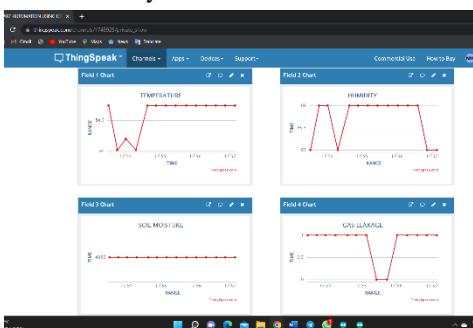


FIG 6: ABOVE FIGURES SHOWS THE VALUES UPDATING IN THE THINGSPEAK

Here the temperature, humidity, soil moisture value, gas leakage and LDR condition values are updating to the Thingspeak cloud.

This paper is implemented with the Arduino, and smart farming uses IOT to see the water level in the field, temperature, and soil moisture. Io smart farming solutions are a type of technology that uses sensors to monitor the crop field Farmers can monitor their farms from any place. Intelligent home automation solutions which uses IoT are designed to control the activities which one is willing to

manage. Wi-Fi devices, for example, use Internet protocols to collect and distribute data. Sensors or detectors on each device then report to a central home automation hub.

The goal of an automated streetlight control system using IoT is to save energy by minimizing electrical waste and personnel. To replace the power-hungry traditional bulbs, the project employs Light Emitting Diodes (LEDs), which consume very little electricity. The street lights detect the movement of items on the street and turn on automatically. The lights are usually turned on after sunset in the evening and remain on until the sun rises the next morning. This paper focuses on saving energy by turning on and off street lights automatically. When vehicles approach the street/road, the sensor detects their motions and the lights turn on automatically. Otherwise, the lights will turn off automatically.

XI. REFERENCES

- [1] Dr. N. Suma, Sandra Rhea Samson, S. Saranya, G. Shanmugapriya, R. Subhashri, (2017). IoT Based Smart Agriculture Monitoring System. International journal on recent and innovation trends in computing, energy efficiency and communication-IJRITCC volume: 5 issues:
- [2] H A Madni: "Automatic street lights that glow on detecting night and object using Arduino".
- [3] Journal on Smart agriculture using IOT by Jaykumar R, Karthikeyan S N, Naveen perumal N, Methini M, (Journal of emerging technologies and innovative research)
- [4] Patil K. A, N. R. Kale, "A Model for Smart Agriculture Using IoT", International Conference on Global Trends in Signal Processing, Information Computing and Communication, IEEE 2016.
- [5] Putjaika, Narayut, et al. "A control system in an intelligent farming by using Arduino technology." Student Project Conference (ICT-ISP), 2016 Fifth ICT International. IEEE, 2016.
- [6] "Smart Energy Efficient Home Automation System using IOT", by Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra.
- [7] "IOT Based Smart Security and Home Automation", by ShardhaSoman, Parikshit Solunke, ShaunakOke, ParthMedhi, Prof. P. P. Laturkar.
- [8] D. K. Rath, "Arduino based: Smart light control system," Int. J. Eng. Res. Gen. Sci., vol. 4, no. 2, pp. 784-790, 2016.
- [9] K. H. S. D. Abhishek and K. Srikant, "Design of smart street lighting system," Int. J. Adv. Eng., vol. 1, pp. 23-27, 2015.