IOT Based Agricultural System Using Thing Speak Cloud

L Chaitanya Lakshmi[1], S. Srikanth[2]
[1]PG Scholar, [2]Asst. Professor, ECE Department, Malla Reddy Engineering College for Women.

Abstract- Automatic agriculture systems area unit convenient, particularly for those that travel. Watering with a hose or with generator wastes water, either methodology targets plant roots with any vital degree of exactness. Automatic agricultural systems might be programmed to discharge a heap of precise amounts of water in a abundant targeted house, that promotes conservation since the preparation and use of wired systems in remote areas is generally impracticable due to high costs, wireless is that the most effective answer. IOT is utilized to transmit the information of those resources to users in associate degree orderly and controlled manner victimization net protocol .The agriculture controller node consists of a micro-processor, transceivers analog to digital converters. Device nodes space unit deployed for field methodology observance and management .The sensing parameters might be displayed as graphical manner in pc. If there space unit any exceed condition of parameters (temperature, humidity, moisture).The projected system makes remote observance getable in agriculture applications. factor Speak is associate open info platform for the net of Things. Our device or application can communicate with factor Speak using a soothing API, and that we able to either keep your info personal or build it public. factor Speak is associate degree net of Things (IoT) platform that permits you to collect and store sensing component info at intervals the cloud and develop IoT applications.

Keywords- Internet of Things, Automation, Smart Agriculture, Thing Speak Cloud, Graphical Display.

I. INTRODUCTION

With the growing adoption of the web of Things (IoT), connected devices have penetrated each facet of our lives from health and fitness, home automation, automotive and supplying, to good cities and industrial IoT[1]. Thus, it's solely logical that IoT, connected devices, and automation would notice its application in agriculture and, as such, staggeringly improve several sides of farming observe good farming supported IoT technologies can alter growers and farmers to cut back waste and enhance productivity starting from the variety of fertiliser used for the variety of journeys the farm vehicles have created. In IoT-based sensible farming, a system is created for AN observance of the crop field with the help of sensors (humidity, temperature, soil condition, Water level.) and automating thee irrigation system. The farmers can monitor the sphere conditions from anyplace[3]-[4]. IoT-based sensible farming is terribly economical compared with the quality approach.In this project one board laptop computer Raspberry pi is used to implement smart farming practice the detector like status, Soil status, Temperature and Water level willwhich is ready to produce a smart field by the farm automatic and additionally the farmer can monitor the crop sward from a large space Network (WAN) mistreatment the Thing Speak cloud wherever all the employed knowledge is to be filed & saved and monitored from a WAN[5].

A. Remote Monitoring & Control

The proposed system also includes an intelligent web-based embedded server for remote authentication and control and monitor the location.

This technology plays a pivotal role in enabling remote access to a person/ owner which requires the username and password if the person want to monitor the agriculture area from the remote area, if the person is authorized then remote monitoring will be enabled and if the person is unauthorized, remote access will be disabled.

Also all the data will be stored in the ThingSpeak Cloud which will have all the parameter with time stored in it with the graphical representation of the raw data sent from our Wireless Sensor Network to the cloud.This subsystem is implemented using Python programming language along with the Linux server and PHP scripts running on the Raspberry Pi 3.

II. SYSTEM DESIGN&ARCHITECTURE

A. System Architecture

The proposed system is a combination of various modules namely Level Sensor, Temperature, Humidity and Soil Moisture Sensor which will be connected to the MCP3008 IC which converts the analog values into the digital values and send the raw data of the sensor to the ThingSpeak cloud using the Wide Area Network (WAN) with IEEE 802.11 standard.

The remote monitoring is done using the cloud i.e. ThingSpeak cloud which is categorized in the Software as a Service (SAAS) cloud. Here the sensor data will be updated and also represented in the graphical form which stores the previous values also which also acts as the data base to store the previous data of the agricultural farm.

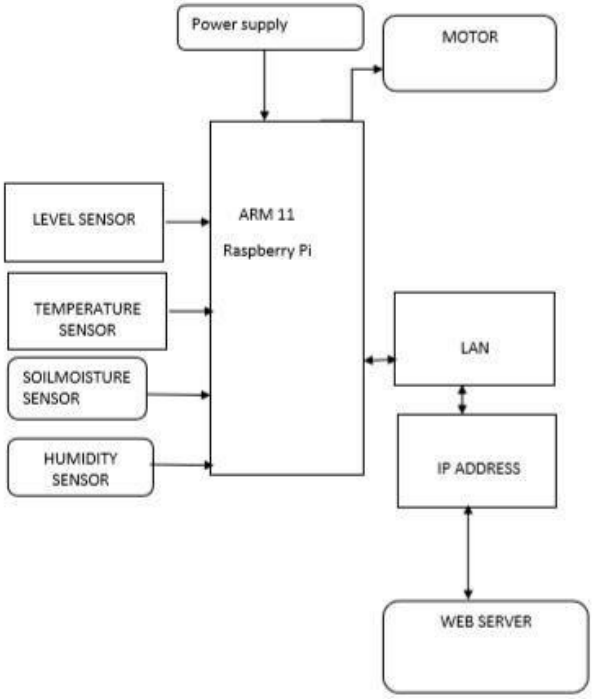

Fig.1: Block Diagram

The heart of this system is the core module which is realized using the Raspberry Pi 3, here a Wireless Sensor Network (WSN) is created which collects the sensor data and send to the cloud.

III. SYSTEM DESCRIPTION

This section gives an overview of the various concepts, components and modules of the proposed system.

A. Raspberry Pi Core Module

The core module of the system is realized using a Raspberry Pi Zero W board; it's a bare-bones computer designed and developed by the Raspberry Pi Foundation, the Pi features a BCM 2835 System-on-Chip which includes a Quad-Core 64-Bit ARM Cortex A7 CPU clocked at 1 GHz paired with 1 GB of RAM[3]-[5]. It also has Video Core IV GPU for graphical processing applications, it also includes micro USB ports for peripherals and 40 Pin General Purpose Input Output (GPIO) pins for interfacing the Pi with external electronic circuits, these GPIO pins are used to interface the Pi to the hardware module[3]-[6]. The Raspberry Pi is designed to run various Linux based operating systems and has Raspbian as its official operating system and Python as its official programming language.

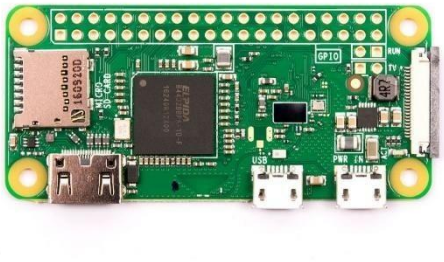

Fig.2: Raspberry Pi ZeroW Module

In this system the core module plays a highly pivotal role and is responsible for various functions, the core module is responsible for acquiring the images from the camera, processing and send mails. It's also responsible for maintaining the update of the location with the image capturing process. It is in charge of employing the authenticated remote access to the server with the controlling and monitoring part. It's responsible for monitoring the senor, controlling modules by sending commands using Python code via GPIO to the motor driver[4].

B. MCP3008 IC

The MCP3008 could be a 10bit 8-channel Analogue-to-digital converter (ADC). It affordable, simple to connect and doesn't would like any additional parts. It uses the SPI bus protocol that is supported by the Pi's GPIO header[3]-[4]. the explanation of a approach to use Associate in Nursing MCP3008 device to offer eight analogue inputs that you utilize with a spread of sensors is delineated.

The first step is enabling the SPI interface on the Pi that is sometimes disabled by default. Please follow web site article to setup SPI and install the SPI Python wrapper[3]-[4]. The subsequent list shows however the MCP3008 will be connected. It needs four GPIO pins on the Pi P1Header.

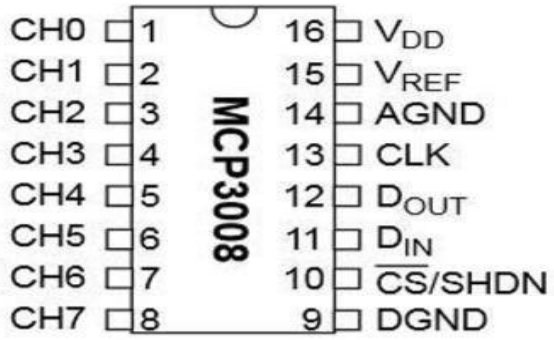

Fig.3: MCP3008 IC

C. Wireless Sensor Networks (WSNs)

A Wireless sensor network can be explained as a network of devices that can communicate the information gathered from a monitored field through wireless links. The data is forwarded through multiple nodes, with a gateway , data is connected to other networks like wireless Ethernet.WSN is a wireless network that consists of base stations and numbers of nodes (wireless sensors).These networks are useful to monitor physical or environmental situations like sound, pressure, temperature and co-operatively pass information through the network to the main location as shown within the figure. Here we are using the wireless sensor network of the Level sensor, Temperature sensor, humidity sensor and the soil moisture sensor.

D. ThingSpeak Cloud

ThingSpeak™ is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute MATLAB® code in ThingSpeak you can perform online analysis and processing of the data as it comes in. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics. ThingSpeak allows you to aggregate, visualize and analyze live data streams in the cloud.Some of the key capabilities of ThingSpeak include the ability toEasily configure devices to send data to ThingSpeak using popular IoT protocols, Visualize your sensor data in real-time, Prototype and build IoT systems without setting up servers or developing web software.

IV. HARDWARE IMPLEMENTATION

This section emphasizes on the actual hardware application of the proposed system, the various modules, components, peripherals and the interconnections between them are discussed here.

Since the Raspberry Pi zero w has inbuilt Wi-Fi and Bluetooth is used for connectivity; the Pi also has an Ethernet port which can be used to gain wired internet access[6].

Using Python programming language preinstalled on Raspbian the source codeof the system is provided and tested appropriately. The USB Camera is connected , the GPIO pins are programmed using commands in Linux and Python in this stage. The camera is connected to the Pi via the USB port and the door lock module is interfaced via the GPIO pins on the Pi[5]-[6].

V. EXPERIMENTAL RESULTS

This section emphasizes on the end results of the proposed system, the system has WSN (Wireless sensor Network) which will send the sensor data to the cloud and continuously updates the values. If any micro change is there is the values of the sensor it will automatically gives the alert and also updates in the thingspeak cloud.

The first stage of the implementation is to prepare the Raspberry Pi 3 module for its first boot; this is done by downloading the latest version of the Raspbian operating system from the official Raspberry Pi website. A microSD card is the formatted using SD Formatter; it's then flashed with the Raspbian OS using Win32 Disk Imager. The first boot is then completed on the Raspberry Pi connecting the required peripherals, such as power supply, keyboard, mouse, Ethernet cable, etc.

The Raspberry Pi for optimal operation requires a quality power supply; the Pi can be driven by using any Micro USB based mobile phone chargers with a good current rating, and this system is powered by a 5V 2.5A power bank for uninterrupted operation[6].

Fig.4: ThingSpeak Cloud

With the high speed automatic update with the graphical form of the raw data is represented in the above figure which is very accurate.

The owner has to provide the username and password to access to monitor the agriculture farm.

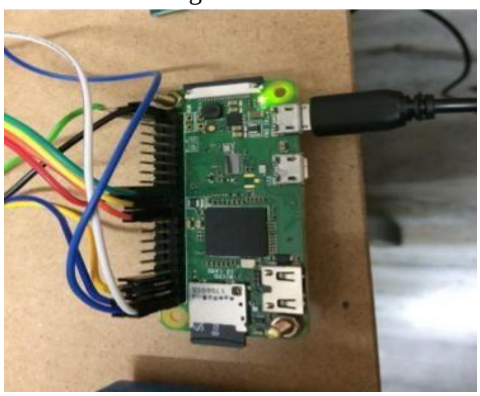

Fig.5: Final Setup

VI. CONCLUSION

In this project, we tend to have a tendency to conferred SmartFarmNet, a pioneering effort in building a climbable detector information acquisition, analysis, and mental image platform for smart farming applications, supported the web of Things with the help of ThingSpeak cloud. we tend to have a bent to conferred the discipline vogue of the platform that aims to support simply regarding any IoT devices, allow quick uptake and therefore the mental representation of IoT information victimization some programming effort, and offer virtual laboratory surroundings for visual image and sharing of study information victimization the ThingSpeak cloud. The projected SmartFarmNet uses a novel and novel amount|period of time|period|fundamental quantity|fundamental measure} math analysis approach that permits near time period responses to user queries. Through analysis victimization actual farming information, we tend to have a tendency to valid the property and quality of the platform[4].

VII. REFERENCES

[1]. SangameshMalge and KalyaniBhole "Novel, Low value Remotely operated good Irrigation" 2015 International Conference on Industrial Instrumentation and management (ICIC) faculty of Engineering Pune, India. May 28-30, 2015

[2]. An Automatic Irrigation System exploitation ZigBee in Wireless detector Network" 2015 International Conference on Pervasive Computing (ICPC)- IEEE 2015 by Pravina B. Chikankar, Deepak Mehetre , Soumitra Das laptop Engineering Department K J faculty of Engineering Management analysis, Pune, Asian nation

[3]. Rasin, Zulhani, HizziHamzah, and MohdShahrieelMohd Aras, "Application and analysis of high power ZigBee based mostly wireless sensor network in water irrigation management observation system," in Industrial physical science Applications, 2009. ISIEA 2009. "IEEE" on. Vol.2. IEEE, 2009.

[4]. Chao Long, Haiyan Liu, Ping Zhou, "System of Remote Irrigation supported GPRS," info Technology Journal, vol:10, pp:1044-1049, 2011

[5]. "Automated Irrigation System employing a Wireless detector Network and GPRS Module" IEEE Transactions On Instrumentation And measuring, VOL. 63, NO. 1, Gregorian calendar month 2014, by Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra NietoGaribay, and Miguel Ángel Porta-Gándara

[6]. "GSM based mostly automatic Irrigation management exploitation Rain gun Irrigation System" International Journal of Advanced analysis in laptop and Communication Engineering Vol. 3, Issue 2, Feb 2014 by R.suresh, S.Gopinath professor, K.Govindaraju academician & Head, , T.Devika, N.SuthanthiraVanitha, Department of Electrical & physical science Engineering, data Institute of Technology.