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Enabled Smart Irrigation towards Smart City with the Help of IOT

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Abstract— Since the Internet-of-Things (IoT) has been introduced, it is considered as one of the emerging technologies providing great opportunities to many industries. One of the major IoT application areas that get significant attention is Smart Irrigation.

Now days smart irrigation gives a great contribution in smart cities as well as build a developed Nation, because in India more than 50% population is depend on irrigation. Smart irrigation system gives less effort and more profit to farmer. By using Raspberry pi processor system become simpler and affordable because raspberry pi is less costly than other processor also it has good peripherals. With the help of python language system becomes simple and understandable because python is simple language. Today python is widely use in industry. For firmware development thonny platform get used. System get data from sensors here system use Rain detector Sensor, Soil moisture Sensor, DHT11 Sensor. From rain sensor system come to know rain fall or not, from soil moisture sensor system get soil moisture of soil, DHT11 is a combination of temperature and humidity sensor. By using this all information firmware controls the state of motor. For data storage in sql system use X protocol. This is commonly used for database maintenances. For user interface there is one GUI and for development of GUI System use Java language. Towards global development smart irrigation become very useful.

Keywords: IoT (Internet of Things), Smart Irrigation, Developed Nation, Peripherals, Raspberry pi, python, Sensor, Soil Sensor, Rain Sensor, DHT11 Sensor, Motor, sql, X protocol, Firmware, Thonny.

1.1 Introduction

Smart irrigation system is a combination of the some smart sensors and one controlling unit. Sensor collects data from soil and atmosphere. Then our system do some operation on sensed data and then it gives output. During this process the data get stored in the database, system can access data for future use. Also system use IOT (Internet Of Things) for access data from any location by using wifi.

In system overview we will get the block diagram of project which clarify the all working principle and below points clarify the aim and objective of project.

1.2 Aim Of Project

Aim of smart Irrigation system is, “In the case of traditional irrigation water saving is not considered. Since the water is irrigated directly in the land, plants undergo high stress due to variation in soil moisture, so ultimate the plant quality and quantity both get affect. This is a system which gives automatic and required amount of water to plant which save the water and quality of soil”.

1.3 Objective Of Project

“With the help of smart sensor and processor we try to develop a smart irrigation system which added into the economy of farmers. Smart irrigation system saves their man power and efforts. Smart irrigation is a system which gives a good growth rate in small duration”. These are objective of smart irrigation system.

1.4 Necessity Of Project

For saving water and quality of soil irrigation system is very important. As irrigation get develops means all the system get develop fast because India is country of farmers.

So as farming sector get develop then ultimate aim of the project get fulfill. By using smart sensors and processor system tries to do many things automatically and smartly.

For smart irrigation this field is very useful and valuable which adds in India's economy. By using such system man power also get save. Because of large or unnecessary amount of water soil become salty and that damage the crop quality that is why only smart irrigation is very important.

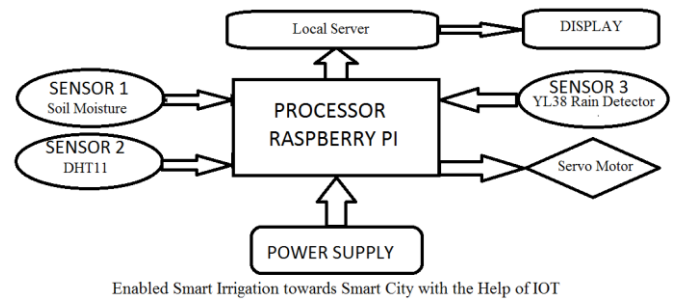
I. Literature Survey

1. JongGwan An, Franck Le Gall, Jaeho Kim, Jaeseok Yun, Jaeyoung Hwang, et al, "Towards Global IoT-enabled Smart Cities Interworking using Adaptive Semantic Adapter". IEEE INTERNET OF THINGS JOURNAL, VOL., NO., 1-13, 2019. This is a first paper from which I get idea of smart city and smart city using IOT. By using IOT we try to design a smart Irrigation system. From such paper we get idea about interworking and FIWARE which we can use in future scope.
2. N. Rouibah^{1,2}, L. Barazane¹, A. Mellit^{2,3}, and B. Hajji⁴, A. Rabhi⁵, "A low-cost monitoring system for maximum power point of a photovoltaic system using IoT technique", 1The Electrical and Industrial Engineering Laboratory, Faculty of Electronics and Informatics, USTHB, Algeria, 978-1-5386-7850-3/19/2019 IEEE. This is second paper from which I get idea for GUI and how to show information on GUI. Basic idea for showing data on GUI by using IOT.
3. Ali Bazzi, Zeinab Kassem, Moustafa Rahal and Majd Ghareeb, "Uni-Bus Assist: A smarter safer bus", Department of Computer and Communication Engineering International University of Beirut, Beirut, Lebanon ali.bazzi@b-iu.edu.lb, 978-1-5090-6011-5/17/2017 IEEE. This is third paper from which I get knowledge of Raspberry Pi module. We select the raspberry pi with the help of this paper. From this paper we get implementation knowledge of Raspberry Pi module.
4. Shradha Somani, Parikshit Solunke, Shaunak Oke, Parth Medhi, Prof. P.P. Laturkar, "IoT Based Smart Security and Home Automation", 978-1-5386-5257-2/18/\$31.00 ©2018 IEEE. This is one more effective paper from which we get knowledge for Raspberry Pi module. The author explain system architecture very well. I just try to utilize some concept like use motor for showing output. Connection of internet to Raspberry Pi then collection of data from sensor, we get this all concept from current paper.
5. 1Shamin.N, 2P.Mohamed Fathimal, 3Raghavendran.R, 4Kamalesh Prakash, "Smart Garbage Segregation & Management System Using Internet of Things (IoT) & Machine Learning (ML)". It is paper which provides knowledge of database. Storage process on server is little

but vast so we use database for storing the data. Architecture diagram gives good idea for database.

II. System Overview

A. Block Diagram



B. Block Diagram Explanation

The above block diagram has six sub blocks; detailed explanation of it is given below:

a) Processor:

For my system we used Raspberry Pi module. Processor is brain of system which controls all operations. It is central part of system. Processor collects the data from smart sensors and has some operations on that data; it stores data in database and then displays the data on screen. We selected Raspberry Pi3B+ module because of following Hardware and Software specifications:

- 1) It have inbuilt WiFi Module
- 2) 1, 2 and 4 Gigabyte LPDDR4 RAM options
- 3) 802.11 b/g/n/ac Wireless LAN

b) Sensor 1:

For sensing purpose we use soil moisture sensor. It sense the moisture level of soil and gives difference in voltage to the comparator and digital value gives to the processor, then processor do some operations on that values. **Soil water content** is a measurement of the amount of water in a known amount of soil; it can be expressed as % water by weight or volume of soil.

c) Sensor 2:

3rd Block is Temperature and humidity sensor it sense atmosphere temperature and humidity. It uses NTC thermistor sensing technique to measure temperature, and a resistive sensing technique use to measure humidity. It is smart sensor so directly digital output gives to system.

d) Sensor 3:

Rain sensor is the 4th block of system which senses the rainfall. A rain sensor is one kind of switching device which is used to detect the rainfall. It works like a [switch](#).

Rain sensor collects data and gives it to processor for further operation. This block gives input to the processor.

e) Motor:

Output block is the 5th one block of system. When processor gets data from the sensor then as per sensation processor commands the motor whether it should be on or off. It is output block of irrigation system. Here used micro servo motor.

f) Display:

For display purpose system use any screen or monitor. Whatever output get from processor it will display on the monitor. For user interfacing we use these block.

g) Power Supply:

Power supply is the key part of system. For irrigation system we used 5V Power supply. Processor required 5V to operate.

III. Software Part

Here for software development we use python language. By using Thonny platform we write the code. Python language has following advantages:

1. Simple language
2. Don't have much more rules like C language
3. Simple to understand
4. Much more ready code are available
5. Simple to use

ALGORITHM

Algorithm of smart irrigation system is given below

Algorithm of Processor:

1. Check the data from soil sensor
2. If soil sensor detects low means soil get dry Means it require water then Motor get On.
3. Else Motor remains Off.
4. Check the data from rain sensor
5. Store it in Mysql
6. Motor remains Off
7. Check data from temperature and humidity sensor which is DHT11 sensor
8. Store the value of temperature and humidity into the Mysql
9. All recorded data store in Mysql database
10. Current data show on screen for user interfacing.

Algorithm for local server:

Note: For example purpose we select sugarcane crop

1. As user click on general info
2. Then the window open which have general information of sugarcane crop
3. If user click on current data
4. Then current data that is data got from sensor get display
5. If user click on list of data
6. Then list of data that is data got from sensor get display in list format
7. If user click on month of plantation
8. Then user select month of plantation
9. After that monthly observation get display
10. User check whether observation meet or not
11. If user didn't get required observation then action window get open

IV. Future Work

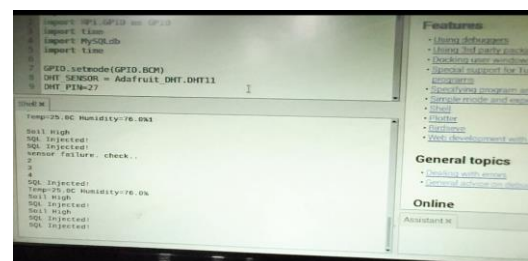
The major concern of this project is that formation of developed country. Our country says Developed country only when it has developed cities. When we specializes our concept then we come to know India is a country of farmers, more than 50% people earn from farming.

Eventually as farming become smart irrigation system then City converted into the smart city and then country became developed one.

So our future task is, like smart irrigation system, work with smart infrastructure, smart water, smart mobility, smart internet and more and we combine it all by using Waspnote Plug & Sense sensor. Waspnote is a sensor on which we can connect 6 sensors at a time and they all have wireless communication facility. We can use multiple waspnote sensor this is a way by which we can embedded all smart system with single one and smart city get develop.

V. Screenshots and Result

Software simulation of smart irrigation system is shown below:



User friendly GUI of smart irrigation is shown below:



VI. Conclusion

Here I would like to conclude system which is **Enabled Smart Irrigation Towards Smart City With The Help Of IOT**. Since the Internet-of-Things (IoT) has been introduced, it is considered as one of the emerging technologies providing great opportunities to many vertical industries. One of the major IoT application areas that get significant attention is Smart Irrigation.

Smart irrigation system gives less effort and more profit to farmer. By using Raspberry pi processor, system became simpler and affordable because raspberry pi is less costly than other processor also it has good peripherals. Today python is widely use in industry because of its simplicity. For firmware development system had use thorny platform. system had use sensors to get data from atmosphere. From rain sensor we came to know rain fall or not, from soil moisture sensor system get soil moisture of soil, DHT11 is a combination of temperature and humidity sensor. By using this all information firmware controls the state of motor. For data get storage in sql system use X protocol. This is commonly used for database maintenances. For user interface system use Java language. Towards global development smart irrigation become very useful.

VII. References

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