

Indoor farming Using IoT

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ABSTRACT: *There are lot of disasters through the environment which causes to the plant growth and loss of so much crops. On their lot of crop losses due to cyclone, heavy rain, powerful sunlight etc. even to get solution on this big scale crops little bit tedious, even very complex and difficult. So, we are trying in to the small scale plant to grow through the artificial environment, there is neither natural air nor sun light. We are making a project so that plant can grow precise and faster than natural growth. So that it can give desire output which we are assuming to get. Because of this condition and isolated nature from nature we called it indoor farming and cause of today life is about on one hand we are including IoT concept on it so that we can even manage it through anywhere.*

Key Words: *mqtt server, TCS color sensing data, IoT, Humidity management, sensor detection data, and Sensor data computing.*

1. INTRODUCTION

An indoor farming using IoT is nothing but the smart greenhouse project we can say, for greenhouse there is receiving of all sun rays and eliminating of all highly ultra-radiated rays to outer side but in this it's not like that. In this there is no natural sun rays. In greenhouse there are so many factors come in mind like sunlight, humidity, temperature. So controlling those factors we need some sensors, so Arduino works to collect all sensors data and controls it as plant requirement. Four sensors have been used are DHT11 humidity and temperature detection, then moisture sensor. Again pH soil, and TCS3200 for color detection.

Again to controlling side there is exhaust fan for cooling and lights for photosynthesis, motor for water supply by different directions. Then again all this parameter sends to Arduino and through it to the subscriber. Which we are using mqtt method of web server which free for everyone.

As we are doing leaf color detection through the TCS 3200 it compares the data base on which stage on leaf is growing as we are considering the light dark green is more perfect health, then Arduino checks the temperature and humidity simultaneously so it controls it by the cooling methodology as we have built. Then at the side of soil pH and moisture, again it is operation of Arduino it collects the information from moisture sensor and again compare with ideal one and as per temperature and humidity which is water pump and motor. It provides the water various ways like the misting shower, drip irrigation. then

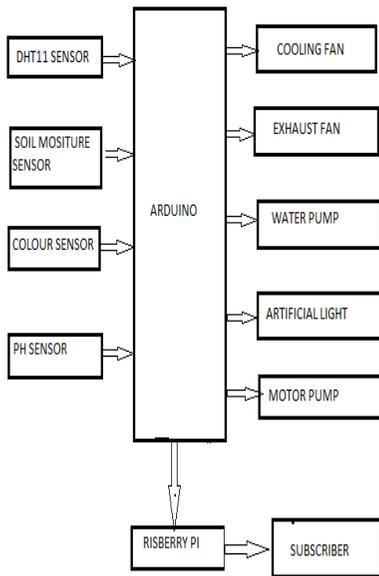
the operation of raspberry pi comes in the side. raspberry pi 3 can make the mqtt server and which more flexible in nature, flexible means it can show the parameter on computer, laptop or in smartphone also and again in some cases machine even don't know what should be the controlling factor right now then that time the subscriber can change the parameter controlling factor through any device which is having internet. As we named it as indoor farming it is basically for those who are growing some plants which profitable but they don't have time to maintain that. So they can maintain their small plants from anywhere far from their home. It can also be used full for farmers also but as per big scale they should have invest some more money but it is going to be one-time investment. They have to install it only one time for a movement then done.

In remaining part, it is divided in section 2 with system overview, Section 3 presents the flow chart. And section 4 shows result and our analysis. Then in section 5 there is all including remarks.

2. SYSTEM OVERVIEW

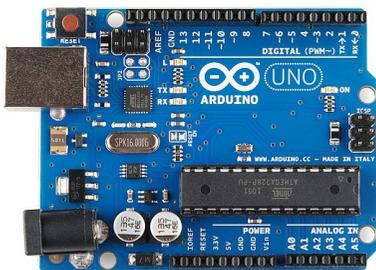
In this system for full working there are two parts of system. In direct one is the detecting part which nothing but sensor works and another is the controlling part which we can call controlling part too. So let's look to the detection part in detection part, there as mention above there are four sensors those DHT11, moisture sensor, pH detector and tcs3200 which is a color sensor. This is the overall view of the detection part. Let's look

to the another part which is controlling part in that part again come some actuator those are as water pump for supply water to the plant through the water container, then water motor again supplying water but for different way, then for cooling part exhaust fan has been used which rotates as per the requirement to maintain the heat and humidity. At the end remain is the artificial light which provides light at a specific time. In all of this detection controlling part of the system go through the Arduino. In this system Arduino plays a major roll of controlling all system.



A. Arduino

This is a best board for play with electronics logics .it got some easy coding and flexible to use so this is somewhat we should use in this project.

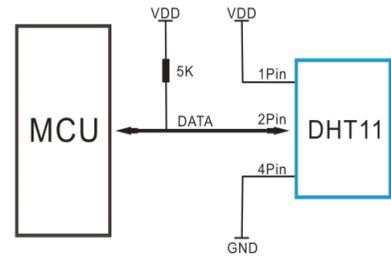


It is again an open source platform for electronics department, with also deals with robotics and everything. Actually "UNO" is board which we are using and Arduino is a company which make this hardware part. This is a kind of controller which so much easy to use.

B Sensors

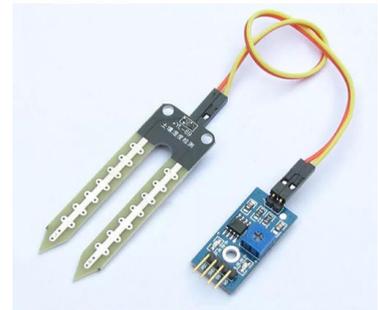
DHT11 sensor

DHT11 Temperature & Humidity Sensor helps to detect the temperature and humidity in surrounding environment with calibrated data. It has some digital acquisition system which analyses the helps in sensing this facts, it got some long term excellent and reliability. This sensor includes NTC component which helps to detection, we can connect it to any 8-bit controller, this sensor got awesome response and speed with accuracy.



Soil Moisture Sensor

Soil moisture sensors measure the water content content in soil. Since the free soil moisture requires cleaning, drying, and soil moisture sensors measure the amount of water content by some other soil, such as electrical resistance, dielectric constant, as amount for the water contain.



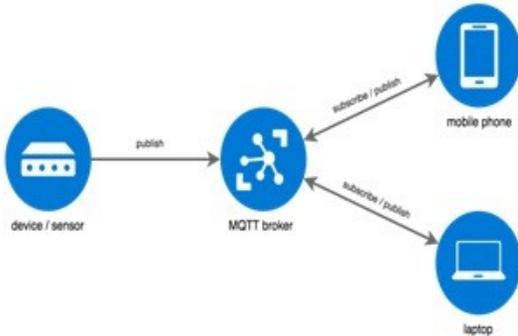
It has two rod which put into the soil .It has three pins one is "5V" and other are "GND" and it got 2 port one which analog one and another one is digital one so we can use as per requirement.

pH Sensor

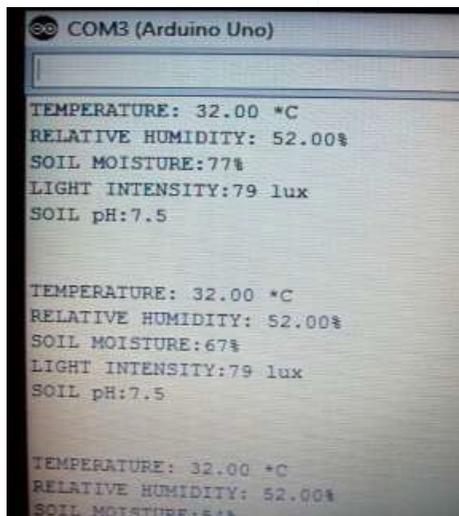


Then turns to the mqtt which web server. This again major role in communication between the system and subscriber. Mqtt is free of cost public server. it gives the specific IP address and a secret identification to the subscriber . then subscriber can watch the all changing parameter in any device with a unique IP address and secret code through internet from anywhere.

that we can also apply it in big scale also but it will cost also in that scale. Over not all, we need real life environment for each farming. Yes, there are some case like mushroom and other but at least indoor is possible. An Arduino based greenhouse monitoring and controlling.



As shown in above the mqtt works their broker between the raspberry pi and subscriber through the any device like laptop or smartphone.



5. CONCLUSION

This project is on small scale so we can conclude