PROJECT REPORT ON SMART GARDENIG USING IOT

Computer Science and Engineering

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ABSTRACT

The Internet of Things (IoT) technology has greatly influenced every area of normal human life by making everything intelligent and intelligent. The IoT refers to a network of things that make up an automatically configured network. The development of devices based on IoT Intelligent Smart Farming changes the face of agricultural production every day by not only strengthening it, but also making it profitable and reducing waste. The aim of this report is to propose an intelligent cultivation system based on the Internet of Things, which will help farmers to obtain living data (temperature, soil moisture) for effective monitoring of the environment, with which they can increase their overall performance and product quality. The IoT-based smart farming system offered through this report is integrated into Arduino technology, which is mixed with various sensors and a wifi module and generates a live data stream that can be accessed online at Thingsspeak.com. The proposed product is tested directly on agricultural fields, which results in a high accuracy of more than 98% in the data flow.

I. INTRODUCTION

There are many applications available to measure and maintain sufficient lighting levels such as laboratories, hospitals, educational institutions, etc. To maintain a healthier and safer environment, sufficient lighting levels in the premises are necessary. Without any distraction as to the condition, the light intensity must be adequate for the intensity of the lighting levels Some of the important locations and the light intensity are indicated in Table 1

TABLE I. Optimum Average Light Intensity at Various Locations. Consider following Applications as an Example

Location	Intensity (LUX)
Homes, Theaters	150

Library(Reading Area)	200
General Office Work	500
class Rom	300

IOT TECHNOLOGY AND AGRICULTURE

IOT has made certain advancements over time and thus have made life of individual easier. We can see certain work which was completed manually earlier, now is done more easily and accurately with help of IOT. It consist of two things that is internet and things the process by which several things acquire access of internet has not only reduced human effort but also saves time and money which can be utilized in some other resources. The use of IOT in agriculture was a great success as it helps farmers in day to day work and also reduces the chances of crop failure. One of the huge problem observe was crops receiving insufficient amount of sunlight due to which they cannot grow properly but with IOT farmers were able to observe areas where proper sunlight is there thus increasing plant growth.

An IOT device connect with various devices to provide internet access to devices which can be eiher wired or wireless thus enabling them to work.

Any IoT based device consists of following components:

- Input or Output Sensors.
- ports for getting Internet access.
- Memory and Storage facilities.

Nowadays, IOT have several applications like smart phones, smart watches, android tv,

cinema halls and various others.

IOT ENABLING TECHNOLOGIES

The Internet of Things has a solid backbone of a variety of supporting technologies: wireless sensor networks, cloud computing, big data, embedded systems, security protocols and architectures, communication protocols, web services, the Internet and

Wireless Sensor Network (WSN): for the purpose of monitoring and combining data several ports are combined together.

Cloud Computing: cloud computing is the biggest feature of IOT because of it accessing data has become easy as all the data are stored are served on servers and the user can access it anywhere just by logging into his/her account.

Big Data Analytics: a large amount of data is analyze with this, examining include different patterns of data, deep data, logical data etc.

Communication Protocols: it includes several measures by which various devices connected together are used. It includes coding of data, data compilation and storing of data on various servers.

Embedded Systems: both the hardware and software parts are included in this to perform their tasks. RAM,ROM, multiprocessor, microprocessor are there in it.

IOT APPLICATIONS IN AGRICULTURE

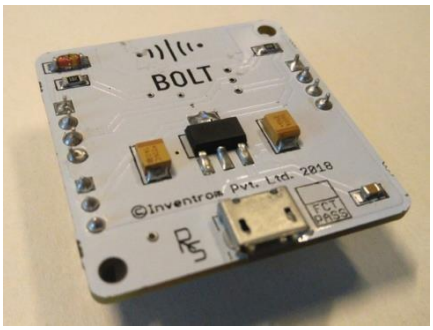
IOT has made progress in every field like agriculture, medicine, teaching, learning, and and due to this it has raised standard of living of an individual. Especially agricultural sector has lot of benefit of IOT as now we can observe different techniques of growing crops

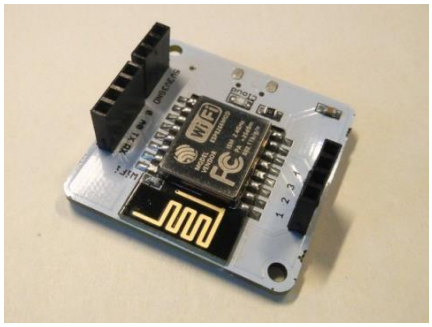
Table 1.1 shows various projects and applications so far of IOT in agricultural sector that has led to its advancement.

Application Name	**Description**
Crop Water Management Project	In order to carry out agricultural activities inefficiently, particular amount of water is essential. Agricultural IoT is integrated with the Web Map Service (WMS) and the Sensor Observation Service (SOS) to ensure good water management for irrigation and, in turn, reduce water wastage.
Precision Agriculture	Very high accuracy required for the weather information, which also reduces the risk of crop damage. The Agricultural IoT ensures timely delivery of real-time data in terms of weather forecasts, soil quality, labor cost etc.
Integrated Pest Management (IPM)	IoT systems used in agriculture provide farmers with precise environmental data through appropriate monitoring of various aspects like temperature, humidity, plant growth and pest level in farm. This data is very important so that appropriate precautions can be taken during production
Food Production	The IoT system in agriculture precisely monitors all parameters such as temperature of warehouse, the shipping management system and also integrates cloud-based recording systems.
Other Implemented Projects	1. The Phenonet Project by Open IoT. 2. Precision of UAV Sensor Platform

BOLT WIFI MODULE

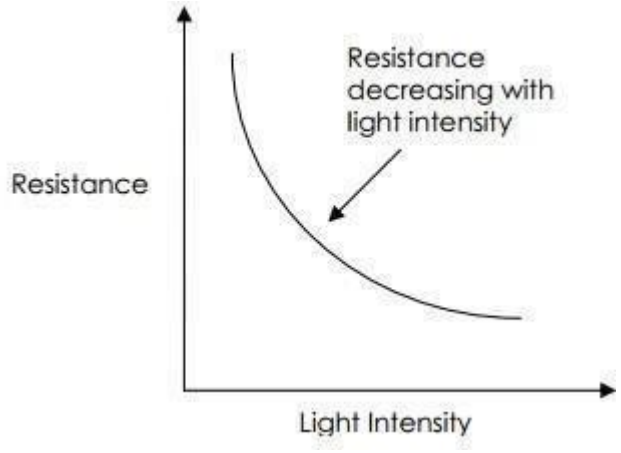
Bolt is an Internet of Things Platform made for Machine Learning. Bolt IoT platform gives you the capability to control your devices and collect data from IoT devices safely and securely no matter where you are. Get actionable insights by deploying machine learning algorithms with just a few clicks to detect anomalies as well as predict sensor values.





LDR

LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits



The most common type of LDR has a resistance that falls with an increase in the light intensity falling upon the device (as shown in the image above). The resistance of an LDR may typically have the following resistances:

Daylight = 5000Ω
Dark = 20000000Ω

You can therefore see that there is a large variation between these figures. If you plotted this variation on a graph you would get something similar to that shown by the graph shown above.

BENEFITS OF IOT IN AGRICULTURE

Here we state some of the uses of IoT in agriculture:

1. The IoT allows for easy collection and management of tons of data collected by sensors, as well as the integration of cloud computing services such as field maps for agriculture.

2. IoT is seen as a key element of intelligent agriculture, as experts can use precise sensors and intelligent devices to increase food production by 70% by 2050.

3. We have also observe that the use of IOT has minimized production cost and hence increases the profit and sustainability.

4. IOT has also seen many advancements in matter related to soil, fertilizer, pesticides etc.

5. With the use of IOT we have also observe that it lead to environment protection .

PROBLEM STATEMENT:

Nowadays, we see farmers feels a lot of challenges in farming as the plants they pot die after sometime due to inefficient amount of light they get so we design a light monitoring system using bolt IOT module that examines a intensity of light and we can record this data, by this farmers will be able to determine as to where place these pots so that they grow effectively.

Tasks:

1. Set up a light monitoring system using the Bolt, and place it near a plant.
2. Ensure that the Bolt WiFi module is powered up, and has a WiFi connection.
3. Have the system log data points for about 1 day, and check when the plant get the maximum and minimum amount of light.
4. Download the data, from the device view page, and plot the graph for this data in an excel sheet.

5. Have your gardener, grandmother, parents, friends or anyone who is into gardening to create an account on Bolt Cloud.

6. Share your Bolt device with them via the Bolt Cloud, and have them view the light intensity data.

Functionalities Of Bolt

- It can connect to a wifi network .
- If any wifi network is not available it has its own wifi hotspot through which user can connect his/her device to bolt.
- It Commands to do all GPIO and UART based tasks.
- It runs over a frequency of 80mhz.

Hardware Connections

Hardware Required

- 1 x Bolt IoT Module
- 1 x Micro USB Cable
- 1 x LDR (2 legged device with a red wave pattern disk on top)
- 1 x 10k Ohm Resistor (brown black orange color code)

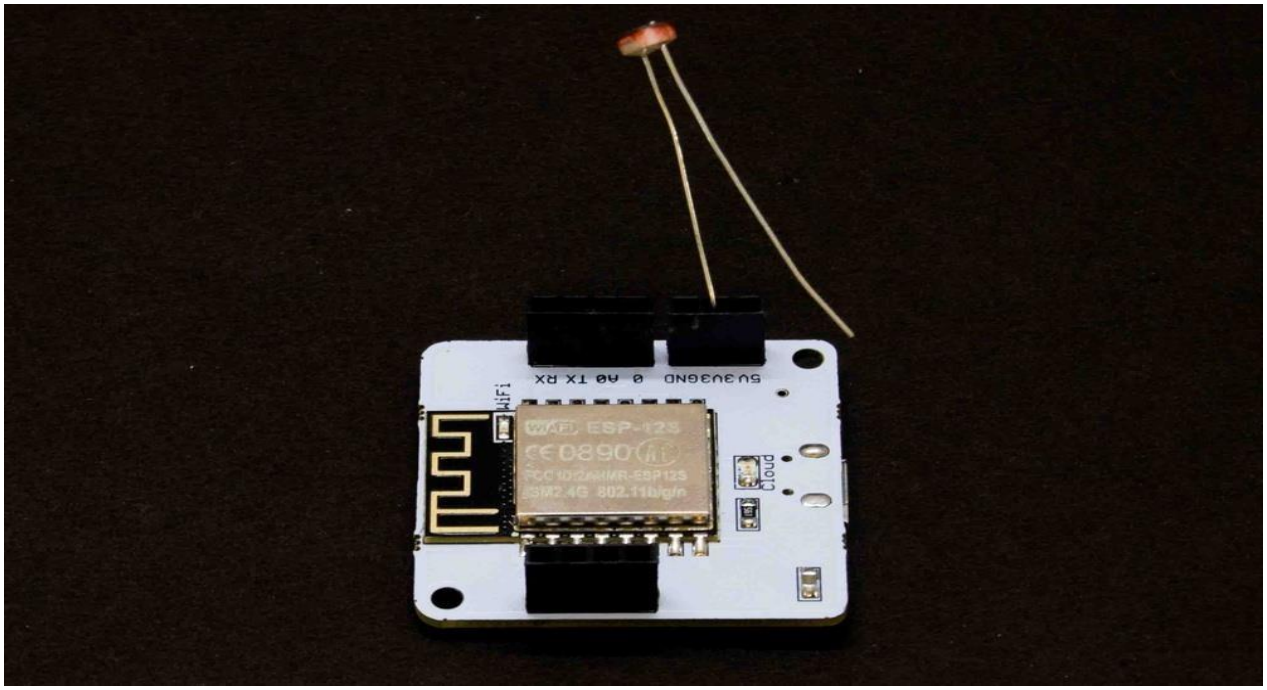
The resistance of an LDR varies inversely with light, i.e., the resistance decreases as the intensity of light falling on the LDR increases.

Connecting the LDR Circuit to the Bolt

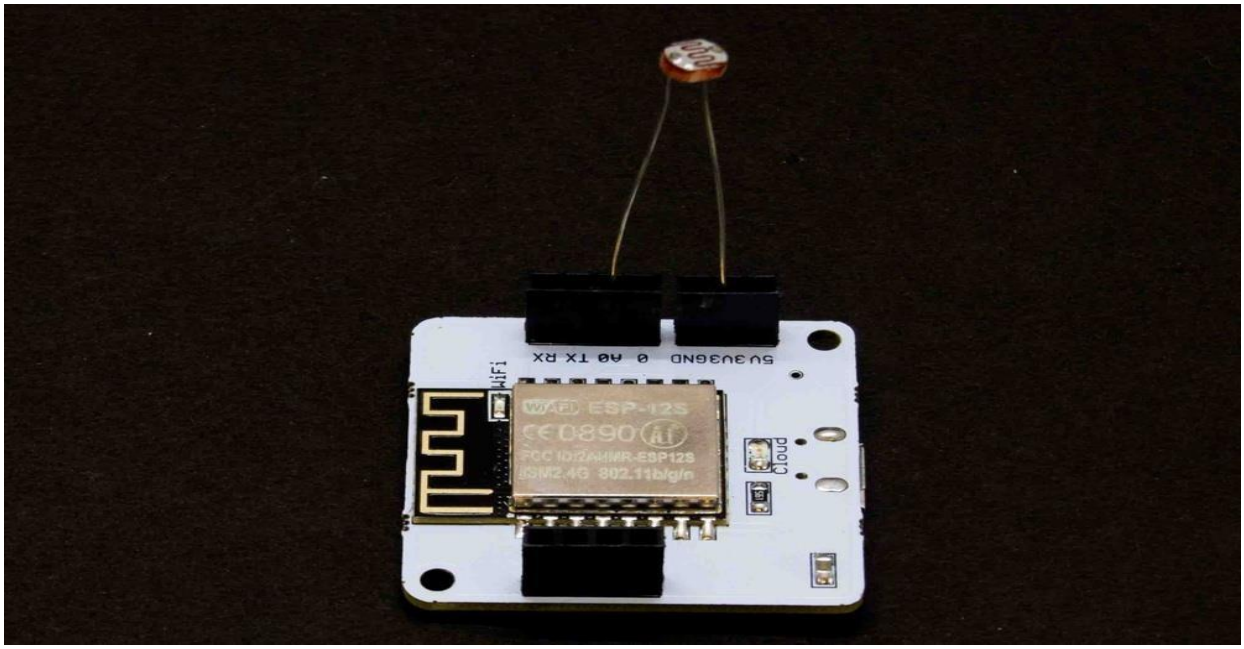
Connect the LDR to Bolt as shown in image below. *Note:* There is no positive or negative for this and the 10k Ohm resistor. Also, make sure the Bolt module is not powered on while making connections. Always make it a habit to power off the circuit while making connections for your own and the circuit's safety. Double-check all connections before turning it on.

Here are the steps for making the hardware connections:

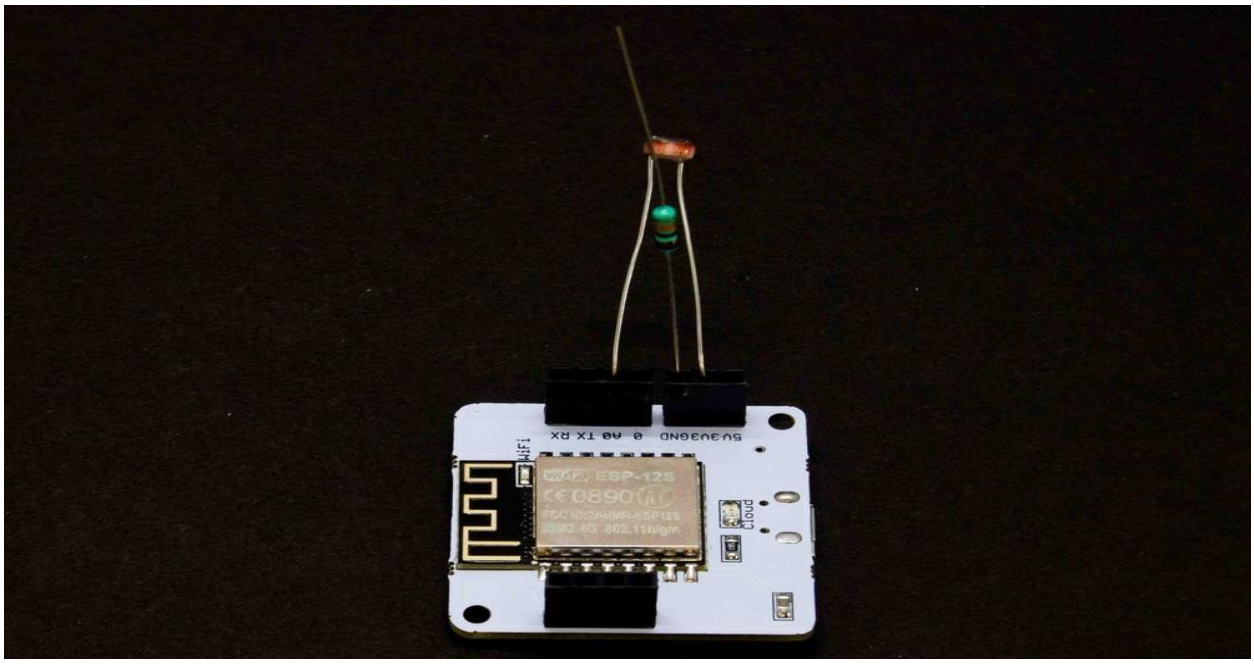
- Step 1: Insert one lead of the LDR into the Bolt Module's 3v3 Pin.



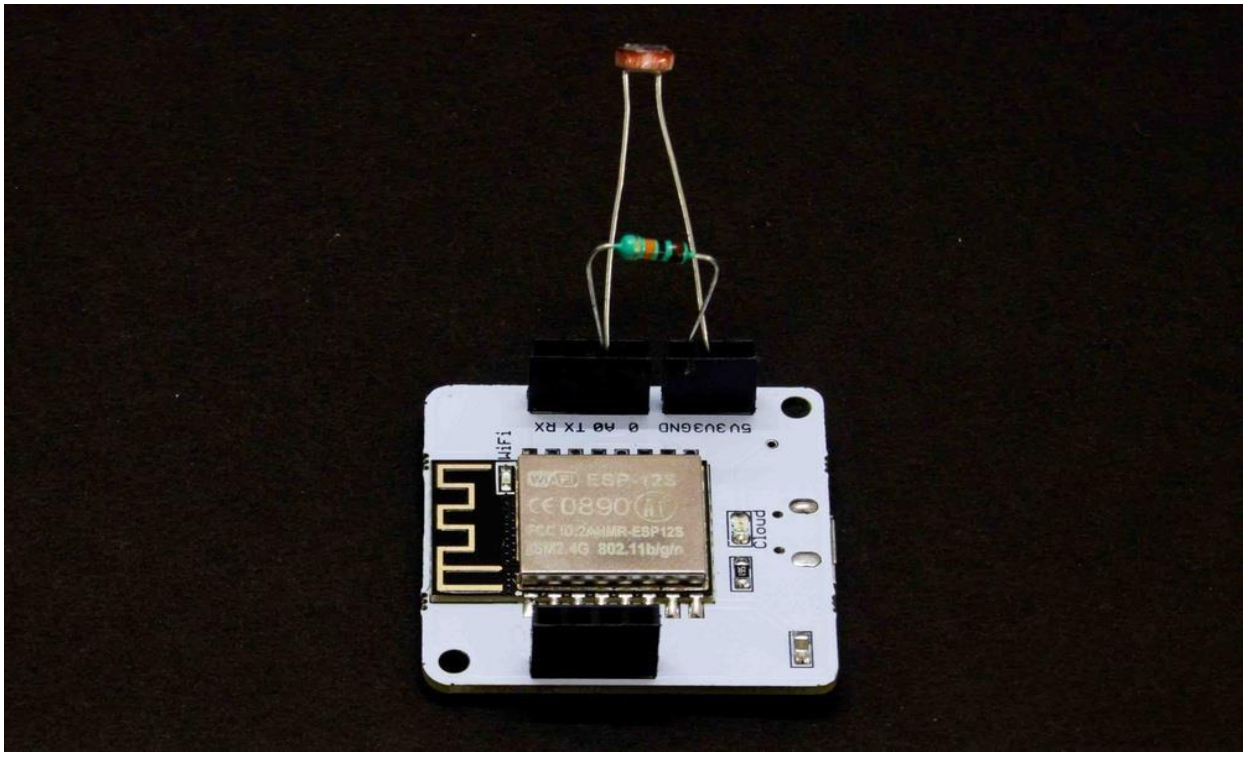
- Step 2: Insert other lead of the LDR into the A0 pin



Step 3: Insert one leg of the 10k Ohm resistor into the GND pin

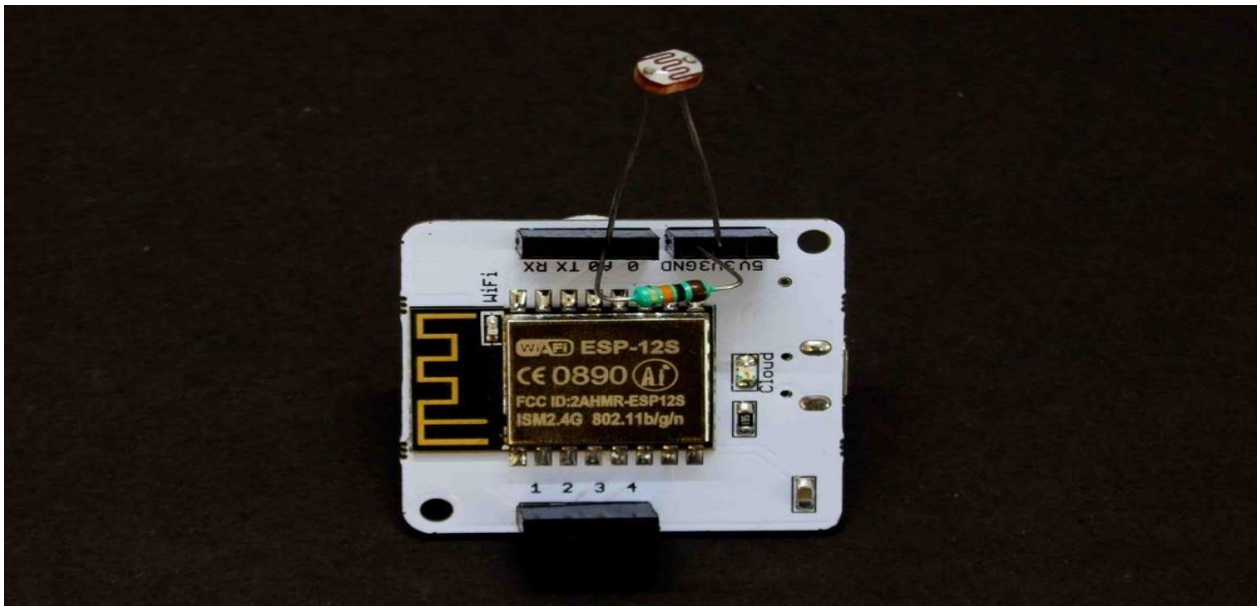


Step 4: Insert the other leg of the resistor also into the A0 pin



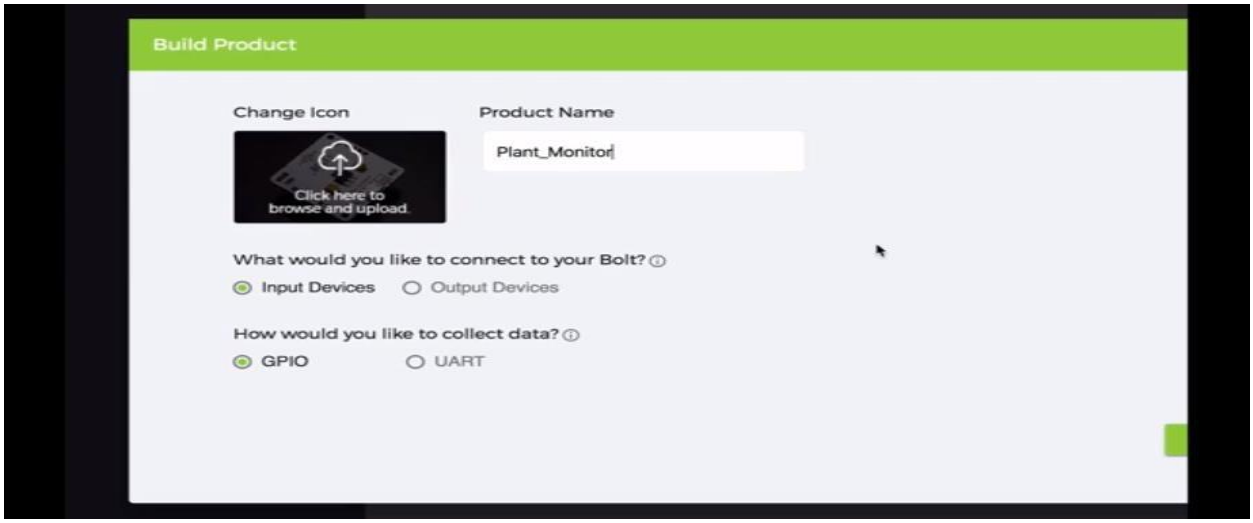
Warning!! Make sure that at no point do the 3.3V (or even 5V) and GND pins or wires coming out of them touch each other. If you short power to Ground without a resistor even accidentally, the current drawn might be high enough to destroy the Bolt module

Thus, we are effectively measuring the voltage across the 10k Ohm Resistor and the final circuit should look like the image below:



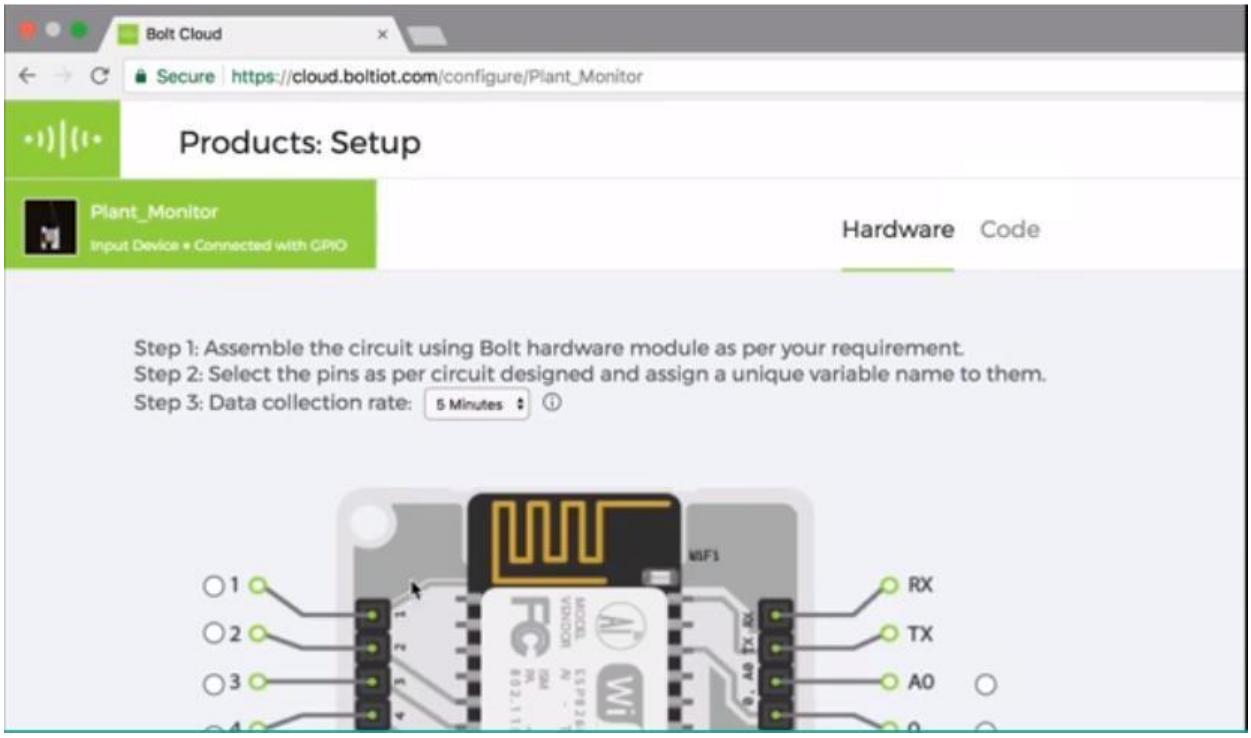
Software work

1) First we will log in to bolt account and build a new product and will give name to our product.



2) Now we will choose to connect input device as LDR is a sensor a input device now we will select to collect data in GPIO format as we have since we have connected LDR to A0 pin that is analogue pin and this pin is GPIO, after this click done.

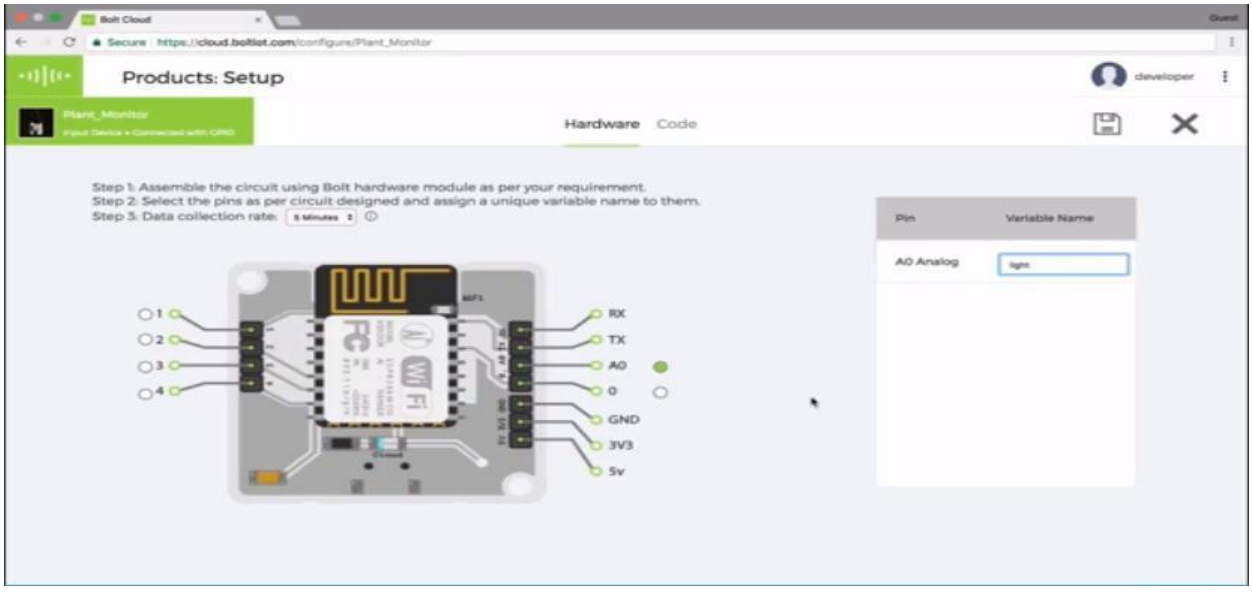
3) Now we have added the product so now we will configure it.



4) Now here we see 3 steps in hardware selection:-

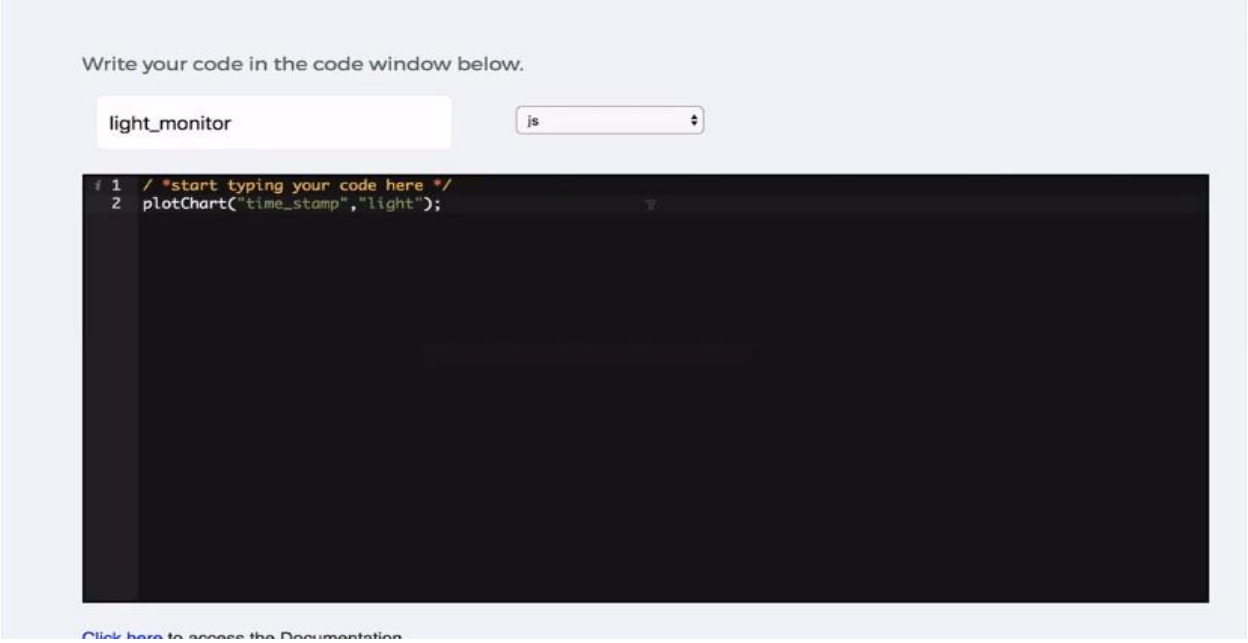
a) First assemble circuit which we have done

b) Now we will select the pins used in circuit and assign a unique variable name to the pin(A0).



c) Now we choose data collection rate that is what will be the frequency of data sent to cloud we select it to be 5 minutes so that we receives data after every short time span.

5) Now we will write some code first give some suitable name to the the file and select its extension as .js

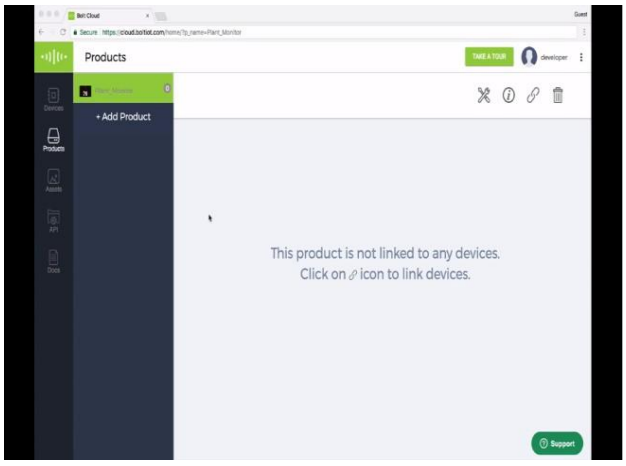


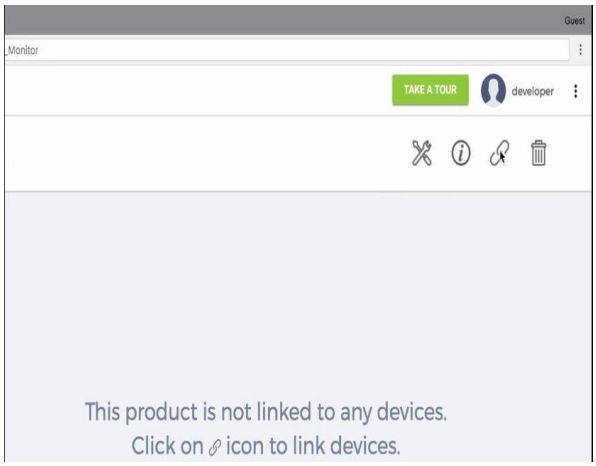
6) Now we just have to write a line of code that is **plotchart("time_stamp","light");** here plotchart() function will collect all data in form of table**, time_stamp** is the time at which the data was collected and **light** is the variable name we have choosen for A0 pin.

7) Now save the product.

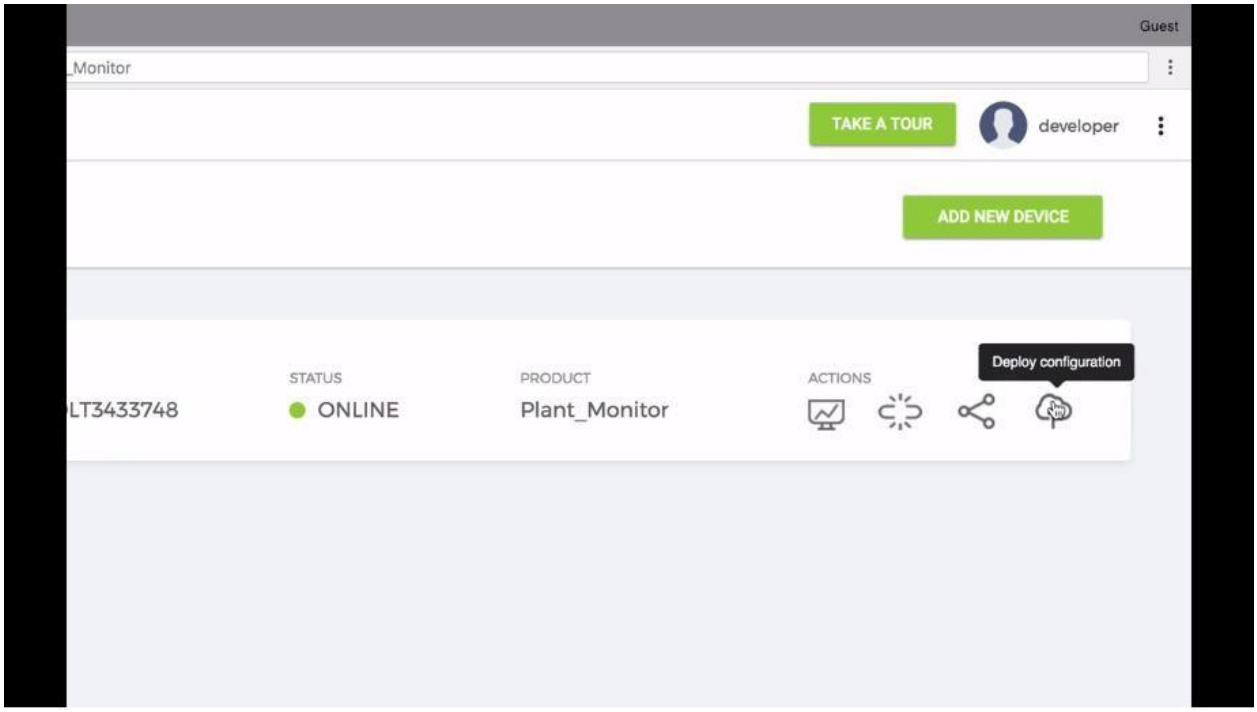
Linking Product To The Device

1) Now we will see our product in products section there click on link button and we can link our product to bolt wifi module.





2) Now code in the configuration needs to be pushed to this device, so we will go to device section and click on deploy configuration button.



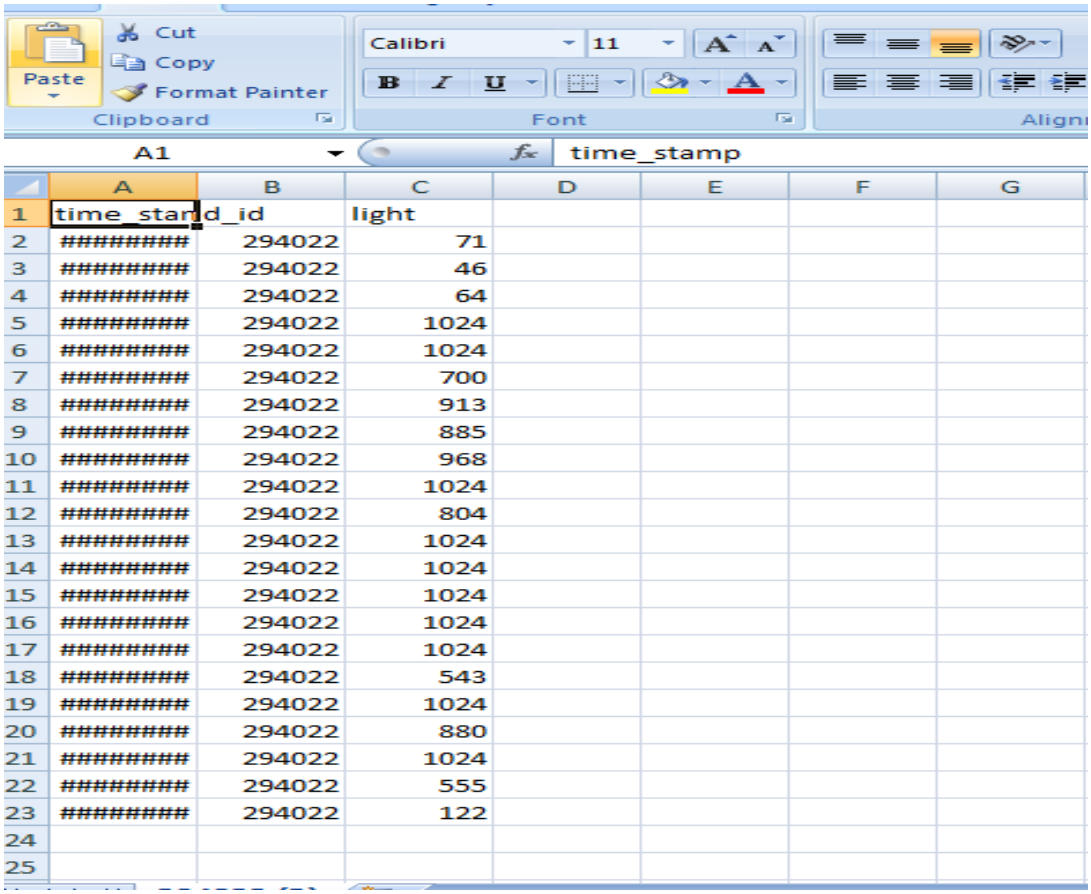
3) Now it will flash the message **"Configuration Deployed Successfully".**

4) Now to view data we will click on view device icon and we will get readings from our plant monitoring system which are sent to cloud.

Results

After doing all the hardware and software we can see the data sent by light monitoring system sent to cloud and can analyze the suitable place that is the place receiving maximum light for plants growth.

We can download this data by clicking on download and can view it in Microsoft excel sheet.



	A	B	C
1	time_stamp	id	light
2	#########	294022	71
3	#########	294022	46
4	#########	294022	64
5	#########	294022	1024
6	#########	294022	1024
7	#########	294022	700
8	#########	294022	913
9	#########	294022	885
10	#########	294022	968
11	#########	294022	1024
12	#########	294022	804
13	#########	294022	1024
14	#########	294022	1024
15	#########	294022	1024
16	#########	294022	1024
17	#########	294022	1024
18	#########	294022	543
19	#########	294022	1024
20	#########	294022	880
21	#########	294022	1024
22	#########	294022	555
23	#########	294022	122
24			
25			

Conclusion

IoT technology is gradually revolutionizing the agricultural sector. Precision agriculture has introduced technology to agriculture since the beginning of this century. The advent and introduction of IoT technology bring this industry to an unprecedented level. Agriculture is brought back to its roots in the observation decision by giving the farmer some extra eyes, which in turn provide a level of control that has been lost since the days of small farming. The advantages of old-fashioned agriculture are combined with the advantages of modern large- scale agriculture through the integration of processes from a variety of technologies, the so- called Internet of Things. In the future, we could see fully automated and robotized agriculture, whose resource efficiency goes far beyond what mankind can currently do. In combination with downstream innovations in the entire supply chain, this could one day lead to sustainable nutrition for all of humanity. In any case, massive gains can already be expected from the application of current technology.

Future Scope

IOT-based smart objects must have unique identities and be able to communicate and interact with each other and with other entities in the network as well as with mobile and web platforms. Many technologies and standards have been proposed to realize IOT's vision, and the interoperability of heterogeneous entities is a major challenge in this area. Agricultural IOT applications have helped farmers monitor crop growth. The advancement of IOT in farms has led to the use of sensors in every phase of the agricultural process, such as: B. the time and processes required for a seed to become an adult plant

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