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# IOT BASED EFFICIENT FARMING TECHNIQUE

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## I. ABSTRACT

In our country, an agriculturist is never paid his deserving pay and a consumer always has to buy vegetables from the market in a much higher price than the actual price of farmers. There is a huge gap between the farmer and consumer, as the consumer needs to go to market to buy vegetables. It is to be noted that farmers growing the vegetables in rural areas, may not have an idea about where and whom to sell the vegetables due to lack of exposure to outside world, which results in wastage of most of the harvest.

The main objective is to create an IoT based automation system that monitors the growthofthevegetablesandfruitsande-marketthesameusingapp.Theworkisdivided into two parts. One part of the work is a hardware which is placed in the farm tomonitor the soil parameters and environmental parameters of the farm. The hardware is enabled withthefeaturesofanalyzingthestatusofthefarmwithouttheinvolvementofthe farmer. The technique helps the farmer to predict the growth and development of the yield so that he knows the right time of the harvest. IoT device can connect the network and also it is interlinked with server to update the data directly into the app and also farmer can know the status of the plant by messages through GSMshield.

The second part of the work is a software application which helps the farmers to monitor the farm and fix price of the vegetable in farm. This application is used to fix a price, can check the sensor values and also can control the motor when crop is dry from anywhere and anytime. The technique is used to communicate the farmer and consumer to estimate the harvest via android app.

**KEYWORDS:** Unified platforms, sensors, Arduino controller, Wi-Fi (IOT devices), GSM shields, Android application.

## II. INTRODUCTION

In the main purposes of the projects are automates in the growing monitors systems to the plant & helps farmer's to the increases in the productivity. These days' farmers are not unable to the fixed into the prices of the vegetable grown between it will get enough income on the agricultures that lead to the economic problem. It is solves in this problem, when it is an unique ideas with the measured in the plants growthstage between the estimations of the yields among the sensors. The project is divided into two parts. One part of the project is a hardware which is placedinthefarmtomonitorthesoilparametersandenvironmentalparametersofthefarm. To implement this project, five sensors are used to detect the parameters of thecrop.

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The second part of the project is a software application which helps the farmers to monitor the farm and fix price of the vegetable in farm. This application runs from the updated server information to declare the yielding time and harvesting time for the consumerstoE-market.Thefarmerandconsumercaneasilyregisterandloginintotheapp toknowthestatusoftheplant.Thisandroidapp isusedto fixaprice,cancheckthesensor values. This project is used to communicate the farmer and consumer to estimate the harvest via android app. On the other end, this can be displayed in the app or webpage for the customers who wish to buy the vegetables can directly check the crop information in his locality without even going to the market and paying huge sum ofmoney.

In India, one-third of the nation's capital comes from farming. In the improvement of the country, issues concerning cultivating have been ceaselessly disappointing. Astute cultivating by modernizing the current standard strategies for agriculture is the fundamental response for this issue, in their endeavor, targets making agribusiness sharp using computerization and IOT progressions. Wise GPS based remote controlled robot to perform endeavors like weeding, showering, sogginess identifying, flying animal and animal surprising, keeping watchfulness, etc are the including features of this endeavor. Sharp water framework with keen control and savvy essential authority subject to correct progressing field data is the consequent one in conclusion wise circulation focus the board which joins temperature upkeep, clamminess backing and theft area in the stockroom. Using any remote quick contraption or PC related with the Internet, these errands will control and the exercises will be performed by interfacing sensors, Wi-Fi or ZigBee modules, actuators with microcontroller and camera, raspberry pi. Execution of such systems in the field will help. The agribusiness part is creating with the methodology of information and correspondence development. Tries are being made to redesign gainfulness and lessen setbacks by using the state of workmanship headways and rigging. Most farmers are unmindful of the advancement and latest rehearses, various ace systems have been made on the planet to energize the farmers. These ace systems rely upon the base of set away data. The propose an expert structure reliant on the Internet of Things (IOT) that will use the data accumulated ceaselessly. Which help to take proactive and preventive exercises to confine the incidents due to diseases and bugs.

Shrewd Farming Based Agriculture IoT Stick is seen as IoT contraption focusing on Live Monitoring of Environmental data to the extent Temperature, Moisture and various sorts depending upon the sensors joined with it. The point/objective of this paper is to propose a Novel Smart IoT based Agriculture Stickassistingtodosmartfarmingandincreasetheiroverallyieldandqualityofproducts. Breadboard mixed in with various sensors and live data feed can be procured online from Thingsspeak.com. The data made through sensors can be successfully shared and seen by cultivating masters wherever remotely by methods for Cloud Computing advancement consolidation. IoTstick alsoenablesanalysisofvarioussortsofdatavia BigDataAnalytics fromtimeto time.TheproductbeingproposedistestedonLiveAgricultureFieldsgivinghighaccuracy over 98% in datafeeds.

## III. CROP MONITORED SYSTEMS

Proposed a provincial usage of remote sensor sort out, guideline work is to realize two sorts of center points and building a sensor orchestrate. Data process unit, radio module, sensor control cross section, data accumulating streak, control supply unit, basic interfaces and expanded electronic interfaces are built up by the hardware organize. TinyOS which is made out of system parcel, device drivers and applications are customizing structure. The essentialness saving count is realized in the item system. The checking framework grasps two frameworks organization shows. Grouping Tree Protocol is a tree-based arrangement show which assembles the data made in the framework into a base station. The dispersal is the comparing movement to the arrangement. The dispersal show is to reliably pass on a touch of control and synchronization rules to every center point in the framework. Finally, the exploratory results show that the checking structure is feasible for applications in exactness agriculture.

## IV. SMART AGRICULTURE

Farmers use an unavoidable decision sincerely steady system to streamline water use. In this interesting circumstance, truth be told, the consistent supervision of

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microclimatic conditions are the most ideal approach to know the water needs of a culture. Remote sensor frameworks expect a noteworthy activity with the methodology of the Internet of things and the theory of the usage of the web in the system of the farmers. It will be judicious to make supervision possible through web organizations. The IoTcloud addresses stages which license making web organizations proper for the things facilitated on the Internet. Fough Ali Karim [7] showed the prepared system for the control of water stress of plants using IOT advancement. In the underlying section of the endeavor depicted the methods for the creation the decision genuinely steady system intended to an agrarian system to have the alternative to evaluate the measures of water required. For water framework the officials, the farmer will get advantage from a dashboard programming as an outline, to screen logically the assortments of the soil conditions and afterward again a method of notice by SMS transmitted by the application when a fundamental level is come to evade water pressure. This application can be improved is to make it propelled one imagines the blend of the technique for evapotranspiration to find out the water essential of a plant for consistently in our course of action of decision help.

## IV. LITERATURE SURVEY

**AnandNayyar, Er. VikramPuri.,"IoT Based Smart Sensors Agriculture Stick for Live Temperature and Moisture Monitoring using Arduino, Cloud Computing & Solar Technology "**

Web of Things (IoT) progression has passed on unsettling to every single field of standard man's life by making everything sharp and shrewd. IoT intimates a game plan of things which make a self-arranging system. The movement of Intelligent Smart Farming IoT based contraptions is dayby day turning the substance of agribusiness creation by improving it similarly as making it cost-effectiveand diminishing wastage. The point/goal of this paper is to propose a Novel Smart IoT based Agriculture Stick helping ranchers in getting Live Data (Temperature, Soil Moisture) for able condition seeing which will connect with them to do sharp creating and expansion their general yield and nature of things. The Agriculture stick being proposed through thispaper isintegrated with Arduino Technology, Breadboard blended in with different sensors and live information feed can be gotten online from Thingsspeak.com. The thing being proposed is tried Live Agriculture Fields giving high accuracy over 98% in information continues.

One of basic districts where IoT set up together look at is going with respect to and new things are pushing on typical motivation to make the exercises logically shrewd and able towards better age is "Development". Developing sectoris saw as the more essential part all around for guaranteeing sustenance security. Discussing India ranchers, which are correct now in a pickle and are at disadvantageous situation as for ranch size, advancement, exchange, government blueprints, atmosphere conditions, and so on. Presumably, ICT based philosophies have dealt with a few issues at any rate are not all around okay for convincing and guaranteed age. Beginning late, ICT has moved to IoT which is for the most part called "Unavoidable enlisting" Agricultural age requires stores of exercises like soil and plant checking, regular watching like dampness and temperature, transportation, stock orchestrate the board, structure the chairmen, control frameworks the board, creature checking, bug control, and so forth.

**Poonsri VATE-U-LAN, Donna QUIGLEY, "Internet of Things in Agriculture: a Case Study of Smart Dairy Farming in Ontario, Canada"**

The objective of this paper is to report a relevant examination of splendid dairy developing in Ontario, Canada which is the inevitable destiny of sustenance creation and ways that movements related to the Internet of Things (IoT). It is influencing upon provincial practice as astute developing. Sharp developing is the demonstration of sagacious provincial organization subject to inventive data gathering farm practice with the ultimate objective of extended levels of significant worth, creation, and environmental confirmation. This paper will portray one model whereby relationship among the educational world, government workplaces and close by sustenance conveying systems in Canada are changing inventive thinking and sharp advancements to convey the need to execute the more feasible cultivating practice. Sustenance from Thought is a Canadian research adventure, in perspective on bleeding edge information structures to make enough sustenance for a creating human masses while supporting the Earth's natural frameworks. The paper will plot how one dairy farmer in Ontario has had the alternative to apply wise developing

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advances to grow milk age while keeping up the quality of his cows and shielding the earth. The review of employments of clever developing in Ontario, for instance, electronic after for an ox-like, genomic testing, painstakingly hailed birth, sensor driven yield the board and data driven dairy creation furthermore nuances in this article.

**K. S. Baek, J. G. Kim, "Effect of Replacing Corn Silage with Whole Crop Rice Silage in Total Mixed Ration on Intake, Milk Yield and Its Composition in Holsteins."**

This assessment was directed to investigate the effects of superseding whole gather corn silage (WCCS) with whole yield rice silage (WCRS) in the full scale mixed allot (TMR) on supplement confirmation, milk yield and its structure in Holstein dairy creatures. The Chucheong rice arrangement (Oryzasativa L. Japonica) and corn (Pioneer 32 P75) were harvested at yellow-prepared stage and were ensiled in round bundles and in channel storage facilities, independently. Two TMR containing either WCCS or WCRS were prepared. These weight control plans were heedlessly doled out to 16 midlactating Holstein dairy creatures (8 bovines for each treatment) and were sustained for 120 days. The underlying 20 days were used for dietary change and for the accompanying 100 days consistently feed utilization, milk yield and its association were recorded. The pH, lactic destructive, NDF, ADF, CP, Ca and P substance were relative in WCRS and WCCS. The DM, trash and EE substance of WCRS were progressively significant differentiated and WCCS. Supplement (DM, NDF, TDN and CP) confirmations were practically identical in bovines supported WCCS- and WCRS-based TMR. Consistently and 4% fat altered milk yield were not impacted by the medications. Milk sythesis (percent milk fat, protein, lactose and total solids) was similar in dairy creatures sustained either WCCS-or WCRSbased TMR. The centralization of milk urea N was increasingly vital in bovines continued WCRS-based TMR than those reinforced WCCS-based TMR. Considering, round-baled WCRS can supersede WCCS in the eating routine of mid-to late-lactating Holsteins with no damaging ramifications for feed usage, milk yield and its association. The present disclosures raise the probability that WCRS can be used as an elective roughage source in the weight control plans of dairy bovines in countries with surplus rice age.

It might be shut from the present results that WCCS can be superseded with WCRS in the weight control plans of mid to late lactating Holsteins with no malevolent ramifications for feed usage, milk yield and its sythesis. This is the rule cash crop in South East Asian countries. Particularly in Korea, rice is a culture and a money related component. From the several years the Koreans abuse rankling and wet summer conditions to create rice. Generally in the wake of social occasion the rice crop, the straw is used to support Korean meat bovines (Hanwoo) and grains are eaten up as a huge staple sustenance. Over the span of the latest couple of decades, introduction of high yielding rice collections and extended agrarian data sources have phenomenally improved the per area of land yield of rice in Korea. Starting late the Korea is conveying more rice than its nearby needs. This situation demands either to diminish the land under rice advancement or to find elective utilization of rice crop. Grains and searches for dairy bovines are imported from various countries to Korea. Ensiling surplus rice respect support dairy steers could reduce dependence on the import of feed. This examination was directed to take a gander at the effects of superseding whole reap corn silage (WCCS) with WCRS out and out mixed allocate (TMR) on feed confirmation, milk and its piece in mid to late lactating Holstein bovines.

**Jonas JATKAUSKAS, Vilma VROTNIAKIENĖ, "Variations in fermentation, bacterial population and aerobic stability in maize silage."**

Whole crop maize in hitter orchestrate physiological improvement of grain (387 g kg-1 dry matter) was ensiled in immense (1.2 m broadness × 1.2 m stature) packages and in 3-liter littler than anticipated storage facilities with either handy lactic destructive tiny living beings (LAB) inoculant Lactococcuslactis and Lactobacillus buchneri or with no additional substances. Storage facilities were opened after 120 days, silage was examined and the enhancement course of action, maturing things and microbial state counts were settled. Gigantic bundle and research focus silage was displayed to air, and high-sway strength was settled. Basic assortment was seen between inoculant treated and untreated huge packs, and inoculant treated and untreated research focus silage. Doable LAB caused decline in destructiveness (pH) regard, a decrease in dry matter (DM) incident, combinations of butyrate, antacid nitrogen (NH3 - N) and alcohols, and an extension in the centralizations of lactic and acidic acids in both tremendous package and research focus silage. Vaccinated silage had lower checks of yeasts and shape in the wake of ensiling and after air presentation, which improved their vivacious sufficiency similar with the untreated silage. The untreated silage had a modestly gigantic degree of

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perceptibly demolished silage at the outside of the enormous packs. The similarities saw between the colossal bundle and research office silage exhibited that little scale silage can fill in as a model for gigantic package silage and can be used to test the feasibility of silage included substances in lab conditions.

When all is said in done, it might be assumed that utilization of functional homo and hetero lactic destructive minuscule living beings (LAB) Lactobacillus buchneri got together with Lactococcuslactis prevailing with regards to changing the silage maturing profile, microbial characteristics and high-sway adequacy of maize ensiled in colossal packages and research focus storage facilities. Vaccination extended the gathering of lactic destructive and acidic destructive, and decreased dry issue (DM) disaster, sharpness (pH), intermingling of butyric destructive, alcohols and smelling salts. Lower yeast and shape remembers for the inoculated silage at opening and after high-sway introduction time of storage facilities related with a higher high-sway adequacy. The temperature evaluated in the silage can be an OK marker for oxygen devouring adequacy in assessment with any single silage constituent. It might be recommended to compel introduction of silage to oxygen during limit and feed-out anyway much as could sensibly be normal because of its obstructing ramifications for silage rot. The comparable qualities saw between the gigantic package and research focus silage demonstrated that lab silage can fill in as a model for colossal group silage and little scale silage can be used to test the suitability of silage included substances.

**Carolina Santos Pereira, Sara C. Cunha, "Prevalent Mycotoxins in Animal Feed: Occurrence and Analytical Methods"**

Today, we have been seeing a suffering affinity in the extension of overall enthusiasm for maize, wheat, soybeans, and their things as a result of the predictable improvement and sustaining of the tamed creatures industry. Thusly, animal feed security has dynamically gotten progressively critical, with mycotoxins addressing one of the most essential dangers. Mycotoxins incorporate different classes of assistant metabolites of molds. Concerning animal feed, aflatoxins, fumonisins, ochratoxins, trichothecenes, and zearalenone are the more dominating ones. In this overview, a couple of objectives displayed by these contaminants at reasonable and business levels will be discussed, close by the sanctioning developed in the European Union to restrict mycotoxins levels in animal feed. Additionally, the occasion of ordered mycotoxins in unrefined materials and their outcomes for the feeds of eagerness, similarly as in the feeds, will be kept an eye on. Finally, an outline of the differing model pretreatment and acknowledgment methodologies declared for mycotoxin assessment will be presented, the essential deficiencies of current systems will be highlighted.

The overview of dispersed reports from 2016 to 2018 on corrupting of maize, wheat, soybeans, their reactions, and animal feed with ordered mycotoxins and their metabolites, made us comprehend this is an issue that is logically pertinent. At the point when all is said in done, it was watched that the standard relationship of maize with AFs and FMs, and of wheat with DON, upheld the assessment of these mycotoxins. Regardless, mycotoxin improvement is a mind boggling and multifaceted wonder whose general sullying and dispersal plans are foreseen to be out and out impacted by natural change because of the nearness of good environmental conditions for parasitic development in phenomenal spots. Thusly, the proximity of mycotoxins is capricious, and as such multi-mycotoxins surveys end become continuously reasonable and preferred, since the examination of only a part of these contaminants gives insufficient information about the risks related with an individual feedstuff. Besides, since co-occasion was routinely uncovered in the years under review, it is typical that this miracle will be moreover tended to in the coming years. Specifically, with respect to soybean and their symptoms, they are less engaged as differentiated and various grids in light of the fact that these infectious toxic substances are not seen as especially risky in this item.

## V. EXISTING METHOD

The idea focus on raising the standard of agriculture with the motto "Total production and Total development across the nation". The product will monitor the status of the farm and help improvising the production by suggesting the use of required fertilizers and pesticides. This Arduino Uno Microcontroller used in the hardware will gather and interpret the data from following sensors are TCS 230 Color sensor, YL 69 Soil moisture sensor,DHT 11TemperatureandHumiditymodule,MQ135GassensorandGSMshield. Now, Status of the farm is sent to farmer's mobile phone through GSM. An application is developed to bridge the gap between consumer and farmer.It only displays crop

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information like price, quantity, duration of time and location of thefarm.

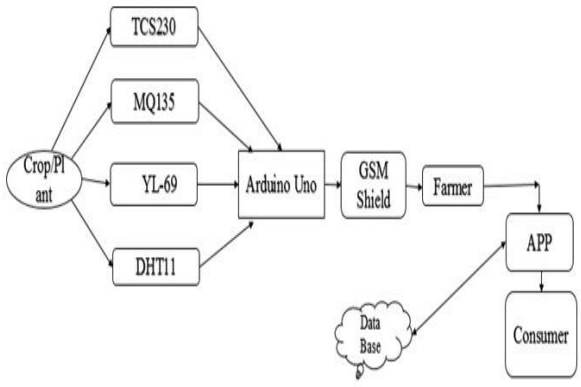


Figure 1 Existing Block Diagram

In previous work Wi-Fi module is used only for connecting network purpose it can't updatethedataintotheapp.Inthisproject usingWi-Fi(SmartIOTdevice)istheadvanced technology. This device can connect the network and also it is interlinked with server to update the data directly into the app. In previous Android app it only displayscrop informationlikeprice,quantity,durationoftimeandlocationofthefarmbutinthisproject it displays crop information and also can check the sensor values to know the status of the plant as well as can control the motor for water pumping automatically whenever the moisture drops below a threshold value. In this project Admin also has login page is the government authority member to check whether this application is profit to farmer and consumerornot.Inthisapplicationconsumergetsthen otificationsabouttheplant growth to know the quality of thevegetables.

## VI. PROPOSED WORK

This project is divided into two parts. One part of the project is a hardware which is placed in the farm to monitor the Soil parameters and Environmental parameters of the farm. The second part of the project is a software application which helps the farmers to monitor the farm and fix price of the vegetable in farm. To implement this project five sensors are used i.e. Soil moisture sensor, Humidity sensor, Color sensor and Gas sensors to monitor the growth of the plant. To design the hardware interface five sensors with Arduino Uno to check the sensor values in the Arduino IDE software.

Now,interfacetheArduinoUnowithbothGSMshieldandWi-Fi(IoTdevice)toknow the plant conditions for farmer. GSM shield is used to send the message to farmer when the sensor values exceed the threshold value than farmer can change the plant conditions.

Alternatively,SmartIoTDeviceisusedtoconnectthenetworkandalsoitisusedtoupdate thesensorvaluesintotheserver.ThisIoTdevice isinterlinkedwiththe iot.iotweb.inisthe PHP based XAMPP server. This server can operate directly in the browser and can also controls the load in web login page. Now, update the IoT data into the android app to communicate the farmer andconsumer. The software application is used to fix a price and to monitor the plant growth. This application runs from the updated server information to declare the yielding time and harvesting time for the consumerstoE-market.Thefarmerto know the status of the plant. Farmer can update the crop information, can check the sensorvaluesandalso cancontrolthemotorwhencropisdryfromanywhereandanytime.

Consumercancheckthecropinformationlikeprice,quantity,durationoftimeandlocation of the farm to buy the vegetables in the android applications.

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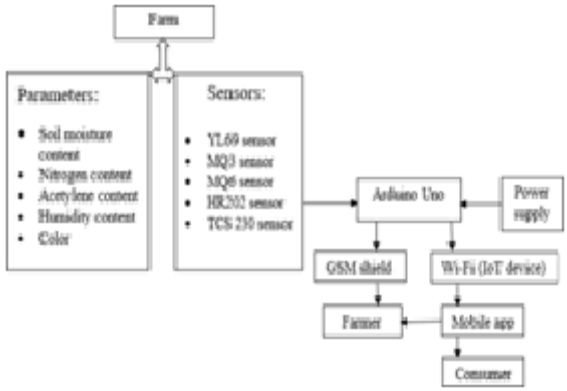


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Figure. 2Green IOT Block diagram

**Motivation:**

- In our country, most of the agricultural production gets wasted because of over production.
- To provide a technical solution for farmers to fix their price for their agricultural products.
- To bridge the gap between farmers andconsumers.

The system model will monitor the growth of tomato plant. A tomato plant is planted and is carefullyobserved.Everyparameterslikesoilmoisture content,humiditycontent,colorof fruit,nitrogenandacetylenecontentparametersaretak enintoconsiderationtomonitorthe growthoftheplant.Todetectttheseparametersusingfiv esensorsareSoilmoisturesensor, Humiditysensor,ColorsensorandGassensors.Theses ensorsareinterfacedwithArduino Uno to monitor plant growth. It is a microcontroller board based on the ATmega328. The board is equipped with sets of digital and analog input/output (I/O) pins which are connectedwithsensorstocheckthevaluesoftheparame tersintheArduinoIDESoftware.

Now, interface the Arduino Uno with GSM shield and IoT device. If initializing the sensors and GSM commands are completed than check the values in the serial monitor. If five sensor values exceed the threshold value than it sends the message to farmer. Alternatively to implement this project use Wi-Fi (IoT device) for data updating to the server with five sensors are Soil moisture sensor, Humidity sensor, Color sensor and Gas sensor. Now, initialize the sensors and IoT than check the values of parameters. The data from the sensors will be directly updated to the cloud is interlinked with the server. In this project usingiot.iotweb.inserveristhePHPbasedXAMPPserv er.Thisservercanoperate directly in the browser and it also controls the load. IoTis interfaced to Arduino through RXandTXpinssuchthatitnotifythestatusoftheplanttof armer.Whencropisdryfarmer can control the motor from anywhere and anytime via androidapp.

## VII. ARDUINO UNO:

The Arduino Uno is a microcontroller board reliant on the ATmega328 (datasheet). It has14digitalinput/yield pins(ofwhich6canbeusedasPWMoutputs),6anal og inputs, a16MHzceramicresonator,aUSBconnection,ap owerjack, anICSPheader,andareset button.TheUno differsfromallpreceding boardsinthatit doesnotusetheFTDIUSB-to-successive driver chip. Or maybe, it incorporates the Atmega16U2 (Atmega8U2 up to variation R2) modified as a USB-to-serialconverter. A Software Serial library contemplates successive correspondence on any of the Uno's propelled pins. The ATmega328 in like manner reinforces I2C (TWI) and SPI correspondence. The Arduino programming fuses a Wire library to adjust usage of the I2C transport; see the documentation for nuances. For SPI correspondence, use the SPI library.

## VIII. SENSORS ANDMODULES

### 9.1 YL69 Soil MoistureSensor:

The moisture content in the soil is an important factor to estimate the growth of the plant. There should be sufficient amout of the moisture in the soil so the plant growth will be maximun and healthy. YL 69 is a simple sensor that can be used to detect soil moisture orrelativehumiditywithinthesoil,thismoduleisablet odetectwhenthesoilistoo dryor wet. Whether the moisture level is high or low based on that it updates the data to the server.it works in 5volts operatingvoltage.

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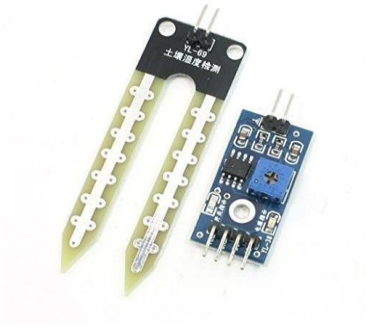

Figure 3. YL 69 Soil Moisture Sensor.

**9.2 MQ3 Gas Sensor:**

The Gas sensor module consists of a steel exoskeleton under which a sensing element is housed. This sensor has 4pins configuration is VCC, GND and A0 is connected to the Arduino analog inputs (A0). This sensing element is subjected to current through connecting leads. This current is known as heating current through it, the gases coming close to the sensing element get ionized and are absorbed by the sensing element. This changestheresistanceofthesensingelementwhichalterthevalueofthecurrentgoingout ofit.


Figure 4. MQ 3 Gas Sensor.

**9.3 HR 202 Humidity Sensor:**

HR202isanewkindofhumidity-sensitiveresistormadefromorganicmacro-molecule materials with relatively low resistivity and this resistivity changes significantly with changes in humidity. The relationship between resistance and humidity is inverse exponential. The low resistivity material is deposited on top of twoelectrodes.

## IX. GSM MODULE

ThecommunicationwiththisGSMmoduleisdonethroughUARTorRS232Interface. The data is sent to the module or received from the module though UART interface. The module is typically connected to +4.0V standard power supply. It can work on +4.5V regulated power and any higher voltage may damage the module. And the power source shouldbeabletodeliverapeakcurrentof2A.TheUARTinterfaceisestablishedasshown in figure. All you need to do is connect RXD of module to TXD of Arduino and TXD is connectedtoRXDofARDUINO.Thegroundofcontrollerandmodule mustbeconnected forvoltagereference.HereAUDIOINisconnectedtoMICandAUDIOOUTisconnected to a speaker or headset.

**10.1 IoT DEVICE (Wi-Fi module):**

Center MCU is an open source IoTplatform. It joins firmware which runs on the ESP8266 Wi-Fi SoCfrom Express if Systems, and hardware which relies upon the ESP-12 module. The articulation "Center point MCU" as per normal procedure implies the firmware rather than the dev kits.ThefirmwareusestheLuascriptinglanguage.ItisbasedontheeLuaprojectandbuilt on the Express if Non-OS SDK for ESP8266. It uses many open source adventures, for instance, lua-cjson, andspiffs.

**10.2 ESP8266 Arduino Core:**

AsArduino.ccbegandevelopingnewMCUboardsbasedonnon-AVRprocessorslike the ARM/SAM MCU and used in the Arduino Due, they expected to modify the ArduinoIDE with the objective that it would be decently easy to change the IDE to help trade toolchainsto license Arduino C/C++ to be requested for these new processors. They did this with the introduction of the Board Manager and the SAM Core. A "middle" is the collection of programming fragments required by the Board Manager and the Arduino IDE to arrange an Arduino C/C++ source record for the goal MCU's machine language. Some ESP8266 darlings developed an Arduino place for the ESP8266 Wi-Fi SoC, conspicuously called the "ESP8266 Core for the Arduino IDE".

## X. RESULTS AND DISCUSSIONS

**11.1 HARDWARE MODEL**

Thehardwareshowsinfig:11 isplacedinthefarmtomonitortheparametersofplant under study and environmental parameters of the farm. The parameters include soil moisture content, humidity content, color of fruit, aretakeninto considerationtomonitorthegrowthoftheplant.Todete

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cttheseparameters followingfivesensorsareusedthatincludeSoilmoisturesensor(YL69),Humiditysensor (HR202), Color sensor (TCS230) and Gas sensors (MQ3 and MQ6). To design the hardware interface five sensors with Arduino Uno is a microcontroller board based on the ATmega328. Theboardis equippedwithsetsofdigitalandanaloginput/output(I/O)pins which are connected with sensors to check the values in the Arduino IDE software. The hardware operates at 5vDC.

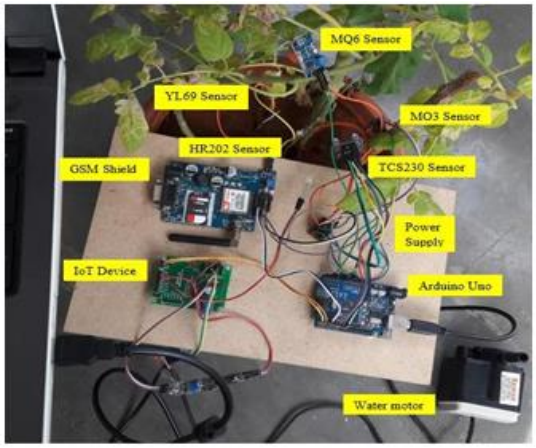


Figure 5.Snapshot of circuit under workingcondition

### 11.2 SOFTWARE DEVELOPMENT

The above android application is developed on Android studiosoftware.Thisapplicationisusedtoestablishacommunicationmediumbetweenfarmerand consumer. Android Home page has administrator, farmer and consumertologin. Farmer can frequently receive parameter updates regarding the health of the plant every day throughSMS/APP.The farmer and consumer can easily register and login into theapp.Farmer can fix a price, can check the sensor values, can send harvesting and notifications forconsumers.Consumer also updates the crop information to know whether given quantity is available or not for a farmer to check the croprequests.

#### 11.2.1 SCREEN SHOT OF DEVELOPEDAPPLICATION:

The sensors data updating to the server from the kit near field to check the values

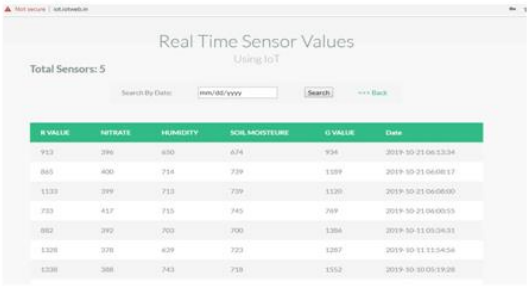


Figure 6IoTserver values.

#### 11.2.2 APPLICATION:

**Administrator Page**:

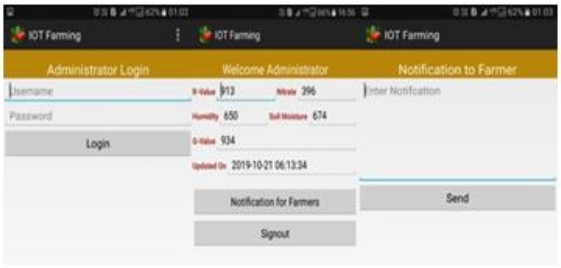


Figure 7Administrator Page.

**Farmer Access Page:**

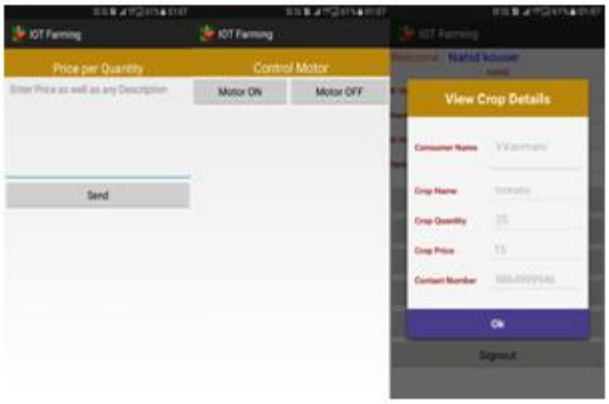


Figure 8Farmer Access Page.

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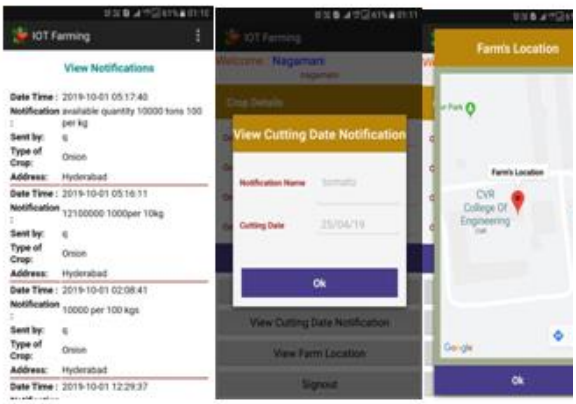


Figure 9Consumer Access Page.

The above android application is developed on Android studiosoftware.Thisapplicationisusedtoestablishacommunication mediumbetweenfarmerand consumer. Android Home page has administrator, farmer and consumer tologin. Farmer can frequently receive parameter updates regarding the health of the plant every day throughSMS/APP. The farmer and consumer can easily register and login into theapp. Farmer can fix a price, can check the sensor values, can send harvesting and notifications forconsumers. Consumer also updates the crop information to know whether given quantity is available or not for a farmer to check the croprequests. By this application consumer gets the harvesting date and notifications about the plantgrowthtoknowthequalityofvegetablesandalsoknowsthelocation offarm.

## XI. CONCLUSION AND FUTURE SCOPE

It is available to IOT data's in the soil parameter & environment parameter regards to the growing for the development of thetomatoes plants in the approximate time from growth into estimated. These are data regards in the various environments parameter to the plants growing into uploading in the PHP base XAMPP into servers. They will be not sensoravailable to the senses in the Lycopene pigments while it is responsible in the colour changes of the tomatoes. In requirement of the colour sensors is raise into the farmers could be knows in the colour& in the stage in the tomato fruits. When there isa limitations of the sensor while is capable of the measures in the plants activity in accurate within the disturb them.

In the hardware coming into the feature of the analyzes in the status for the farms with the involvements to the farmers. They will be productshelping intothe farmers to the predicts in the growth & improvements intheyieldtherefore so as tocanknows intherighttimesto theharvesting.The information's to durations, grows rate analyzingthe length of the quantity value in the production obtainintousesintodropping the wastage, Between the farmers hard worked is doesn't goingintoineffective. These are applications helping in the farmersfrom selling inthe yields in the consumer into directly in its place of the sellinto the mediator withthe markets. The solutions is creatingan new ways of the trade introduced e-Marketsintothe fieldsof the agriculture productions. This products have been the potentials from altering in the demands & supplying, so the estimationsof the growth or developmental could be helps into maintains economically balances into reduces wastage.

## FUTURESCOPE

As there is a lot of future scope relating to this particular measuring the plant growth in to According to the literature survey there are no precise sensors available to predict the flowering stage, fruiting stage and ripening stageexactly.As all the farmers may not be educated the entire details can be made available in a platform in a better and simpleway.Creation of a user-friendly platform where all the details can be made available by one click along with the additional facilities like sales using netbanking.Acost effective and efficient method to analyze the quantity of vegetable or fruit.

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