ISSN: 2454-9940

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

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www.ijasem.org

INTERNATIONAL JOURNAL OF APPLIED SCIENCE ENGINEERING AND MANAGEMENT

ISSN2454-9940www.ijsem.org

Vol 9, Issuse.4 Dec2021

SMART RASPBERRY PI AND NODE MCU-BASEDE-AGRICULTURESYSTEM

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ABSTRACT: Agriculture is one of the main factorscontributingtotheeconomicgrowthofmanynations.Itisalsotheprimarysourceoflivelihoodof majoritypeopleintheworld.Theprojectdesignedanddiscussed is a smart farming system that can handlealmost allessential facts relatedto irrigation andcrop growth. From the farmer's point of view, smartfarmingshouldprovidethefarmeradvantageofdustcontrol and with added value in the form of betterdecisionmakingormoreefficientexploitationoperationsandmanagement.Byreferringtothissystemitc ansolveproblemslikemonitoringofwater,soil degradation, etc. In this paper, by using Pi it canmonitorallotherapplicationslikeGSM,digitalsensors,and DCmotorwithpump

Keywords:IoT,NodeMCU,RaspberryPi,Relay,Sensors.

1.INTRODUCTION:

InIndiaagriculturecontributesabout22%ofthecou nty'seconomy.Smartagriculturedoesnotonlyfocu sondistancefarming but also on yield growth. We arein a situation

Where we have limited landtocultivateandunexpectedclimaticchangesw hicheffectsthecropgrowthandyield which is not sufficient for the hugeworldpopulation.Thisprojectaimstocropsur veillanceandinmaintainingfactors needed for good crop growth. Ithelpsingettingmoreyieldwithfewerresources.T heidentificationofdiseasewasdonemanually,inall ofthese

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techniques the digitaldomain is widelybeing used. The use of a digital systemgivesintuitivejudgment.Theearlyjudgmen

rovidegoodresultsinreturn.Inmostcases,thedisea sesymptoms are seen in the parts of the leaf,stem, and fruit. In this, we are developinga systemthat detects the disease present intheplant

an automatic irrigation device androoftopcontrolsystemforthefarmeronthe premiseoffWi-Fisensorcommunity.Theyhave developed a mobile application. Thesystemdealswithreal-timeobservationwith h efficient use of the cheapest securitysystem.ThissystemusesRaspberryPi,sensors, an IP camera, and their

tofdiseasemakesthefarmeravoidlossesAgriculturewillp

leaf.

2. Literaturesurvey:

The paper aimsatdesigninga completedevicethatchthathelpstoautomizetheagriculturalfield,whichreducestheworkloadonfarmers.Thisproposedsystemprovides methodology. The difficulty faced is in theuseofastrongsecuritysystemforbothdaya nd night. The challenge faced by them isto turn the traditional method of irrigationinto a modern method by introducing theextent of automation to monitor the field.Theaimistomakeasmartagriculturesyst em bytheuseofatechnique calledPrecision Agriculture (PA) majorly used ingreenhousefarming.Themainofthesystem istoreduceoneof themajoragriculture problemsthatare turningthemotor on and off. To avoid this wirelessmonitoringirrigationsystemis developed.

3. Methodology:

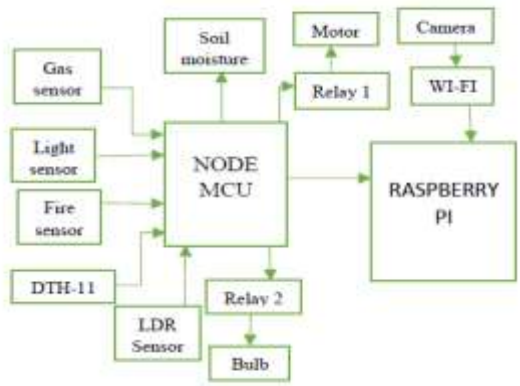
A. ProblemStatement:

The major problem that farmers face isthe irregular -distribution of water in thefield.Cropsdonotgettherequirednutrien tsbecauseofpoorsoilqualitywhichresultsin theirimproper growth.

B. Proposedsolution:

We are designinganIoT-basedSmartAgricultural Aid System which is basedonRaspberryPIandNodeMCUautomati callybysensingtheessentialfactorsbythesenso rs.Themoisturecontent and humidity and temperatureare measured using the Soil MoistureSensorandDHT11Sensorrespectiv ely.NodeMCUisusedtoconnectallsensorsa ndcarriesthesensor'sinformation to the Raspberry Pi. Thecamera is used to monitor the crop andforsurveillance. HerecameraconnectedRaspberry PI isused asaserver. Relays are used as switches foroperating motor and light. Motor runsonlywhenthewatercontentislessthanthe value of the threshold in the soil.Electronicfencingtoavoidanimalsenteringinsi deanagriculturalland.Agassensorisusedtodetectthe concentrationofCO_2inthegreenhouse.The total information is updated on theweb server at a regular interval of timeasgraphs.

FunctionalBlock Diagram



Block Diagram

Initially,allthesensorssensethecondition of the humidity, temperature,light,andCO_2concentrationinthegr eenhouseandsendittotheNodeMCUthentheinfor mationissenttotheRaspberryPi.RaspberryPIthe nanalyses

4. WORKING:

Sensornetworknodesaretinyobjectswhichareinstalle dinthedifferentmonitoringareasofthewirelesssensor networks,tomeasurevariousphysicaldataand finish the specified task. Improvementin the growth of various crops dependsonvarious environmental parameters such aslightintensity,soilmoisture,relativehumidity,soiltemperature,usageoffertilizers andpHofthesoil,etc.

A. TemperatureSensor:

The temperature sensor used in the projectisLM35whichisanIC.Ithasthreeterminalsandrequiredamaximumof5.5Vsupply.

This type of sensor consists of amaterialthatoperatesaccordingtotemperaturetovarytheresistance.Thischangeofresistance issensedbythecircuitand it calculates the temperature. When thevoltage increases then the temperature alsorises. It shows temperature ranges from 0-50 degrees census with an accuracy of 0.5degreescensus.

B. SoilMoistureSensor:

The Moisture Sensor detects the moistureofthesoilaroundthesensor,whichisideal formonitoringtheplantsorthesoilmoisture.

This sensor uses the two probesto pass current through the soil, and then itreadsthatresistancetogetthe moisturelevel. Excess water makes the soil conductelectricity better; while dry soil conductselectricitypoorly.Thefigureshowsatypical soil moisture sensor and the outputon the LCD from the sensorused in theproposedsystem

C. RainSensor:

Therainsensordetectswaterthatcompletes the circuits on its sensor boards'printed leads. The sensor board acts as avariableresistorthatwillchangefrom100kohms when wet to 2M ohms when dry. Inshort, the wetter the board the more currentthat willbe conducted.To test the RainSensorandensurethatitisworkingcorrectly connect the VCC to a 5v powersourceandGND.Tryplacingafewdropletsofwaterontherainsensordetectionboardand the D0-LED should light up. The codeused for the rain sensor maps and reads theanalog values given by the Rain Sensor (0-1024).

D. LightSensor:

There are different types of light sensorsavailablesuchasphoto resistors,photodiodes,photovoltaiccells,phototubes,phototransistors,charge-coupleddevices,andsoon.But,LDR(Light Dependent Resistor or photo resistorisusedas alightsensor.

Humiditysensor:

Thehumiditysensorsensesthehumidityin the soil, it helps in the maintenance ofabout45%-90%humiditylevelforhealthygrowthofthecrop. Ifthehumiditylevelisbelowthethresholdvaluethemotor is opened.

Gassensor:

The gas sensor is used to calculate theconcentrationoftheCO2gasintheatmosphere. If the co2 concentration isless then the rooftop and side walls canbelifted.

Fig: Outputoftemperaturesensorontheweb

s

Fig:outputofhumidity sensorontheweb

Result:

Fig:CircuitDiagram

Fig: Output of thegassensor ontheweb

Fig: Outputofsoilmoisturesensorontheweb

Fig: Outputoflightsensorontheweb

Fig: OutputofIRsensorontheweb

The values from the sensors are directlysent to the web app through the internetwiththehelpofNodeMCUandRaspberry Pi.Hence,byusingthethingspeakapp,afarmercan gettheinformationabouthislandandcropsdirectly in the app sitting at any corner.This reduces the tiredness faced by himduetooftenvisitingthisfarmforobservation. The app gives the values inthe form of a graph so that the previousvalues can be easily studied and thus thefuturevaluescanbepredicted.Theoutput from the sensors is given out bythewebapp.

CONCLUSION

The proposed system provides a simple,cost-effective, eco-friendly, and efficientsolution forirrigation. This system canprove to be highly beneficial in manydevelopingnationswhoseeconomyissupported by agriculture.It also aims tosolve the problem of the energy crisiseffectively. This system also eliminateswaterwastageandreduceshumanintervention,therebyleadingtoeconomic growth, increasedproductivity,morepeopleadoptingsmartfarming,andtherebyincreasingtheincome of farmers. This system wouldthereforeenablethegrowthofagricultureto a great extentand attract more peopletoagriculture.

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