ISSN NO: 9726-001X
Volume 11 Issue 02 June 2023

JOURNAL OF CURRENT SCIENCE

NEC-Based Node MCU-Based Raspberry Pi Agriculture System

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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%ofthecounty'seconomy.Smartagriculturedoesnotonlyfocusondis tancefarming but also on yield growth. We arein a situation where we have limited landtocultivateandunexpectedclimaticchangeswhicheffectsthecropgrowthandyield which is not sufficient for the hugeworldpopulation.Thisprojectaimstocropsurveillanceandinmaintainingfactors needed for good crop growth. Ithelpsingettingmoreyieldwithfewerresources.Theidentificationofdiseasewasdonemanually,inalloftheset echniques the digitaldomain is widelybeing used. The use of a digital systemgivesintuitivejudgment.Theearlyjudgmentofdiseasemakesthefarmeravoidlosses Agriculturewillpr ovidegoodresultsinreturn.Inmostcases,thediseasesymptoms are seen in the parts of the leaf,stem, and fruit. In this, we are developinga systemthat detects the disease present intheplant leaf.

2. Literaturesurvey:

The paper aimsatdesigninga completedevicethatchthathelpstoautomizetheagriculturalfield,whichreducestheworkloadonfarmers.Th isproposedsystemprovides an automatic irrigation device androoftopcontrolsystemforthefarmeronthepremiseoffWi-Fisensorcommunity.Theyhave developed a mobile application. Thesystemdealswithreal-timeobservationwith h efficient use of the cheapest securitysystem.ThissystemusesRaspberryPi,sensors, an IP camera, and their

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methodology. The difficulty faced is in theuseofastrongsecuritysystemforbothdayand 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.Theaimistomakeasmartagriculturesystem bytheuseofatechnique calledPrecision Agriculture (PA) majorly used ingreenhousefarming.Themainofthesystemistoreduceoneof themajoragriculture problemsthatare turningthemotor on and off. To avoid this wirelessmonitoringirrigationsystemis developed.

3. Methodology:

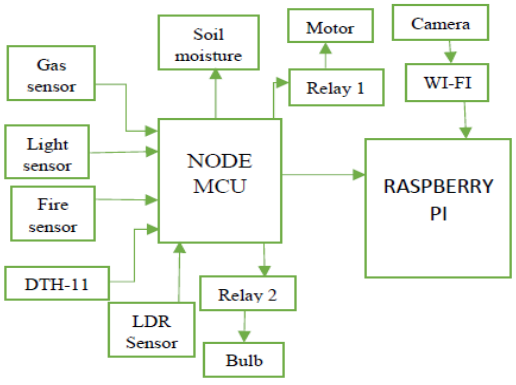
A. ProblemStatement:

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

B. Proposedsolution:

We are designinganIoT-basedSmartAgricultural Aid System which is basedonRaspberryPIandNodeMCUautomaticallybysensingtheessentialfactorsbythesensors.Themoisture content and humidity and temperatureare measured using the Soil MoistureSensorandDHT11Sensorrespectively.NodeMCUisusedtoconnectallsensorsandcarriesthese nsor'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.Electronicfencingtoavoidanimalsenteringinsideanagriculturalland.Agassensorisusedtodetectthec oncentrationofCO_2inthegreenhouse.The total information is updated on theweb server at a regular interval of timeasgraphs.

FunctionalBlock Diagram



Block Diagram

Initially,allthesensorssensethecondition of the humidity,

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temperature,light,andCO2concentrationinthegreenhouseandsendittotheNodeMCUthentheinformationissenttotheRaspberryPi.RaspberryPIthenanalyses

4. WORKING:

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

A. TemperatureSensor:

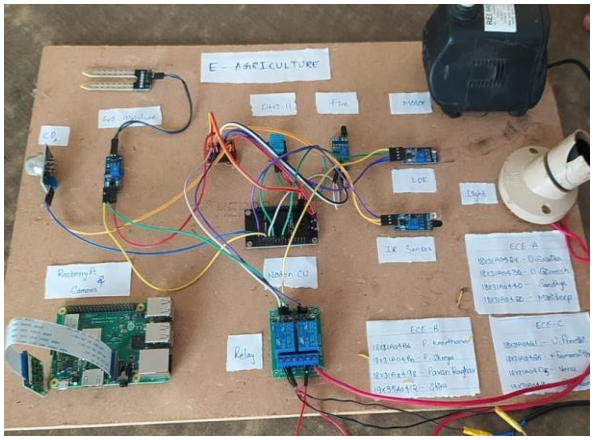
The temperature sensor used in the projectisLM35whichisanIC.Ithasthreeterminalsandrequiredaa Maximumof5.5Vsupply. This type of sensor consists of amaterialthatoperatesaccordingtotemperaturetovarytheresistance.Thischangeofresistanceissensedbythecircuitand it calculates the temperature. When thevoltage 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

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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.

Result:

Fig:CircuitDiagram

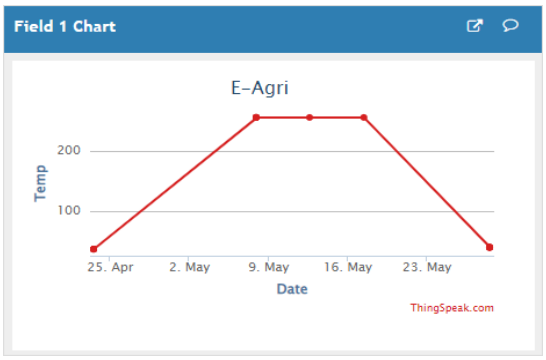
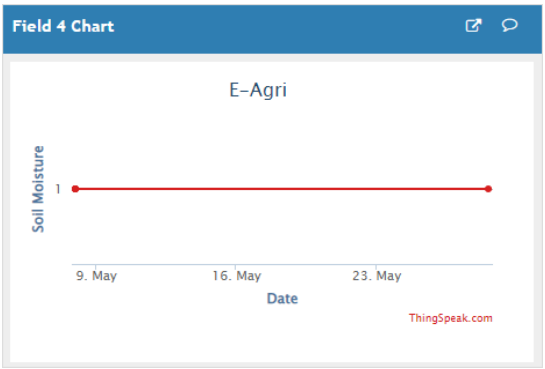


Fig: Outputoftemperaturesensorontheweb



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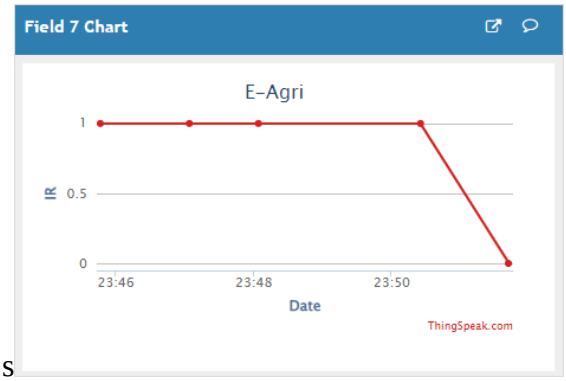

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Fig:outputofhumidity sensorontheweb

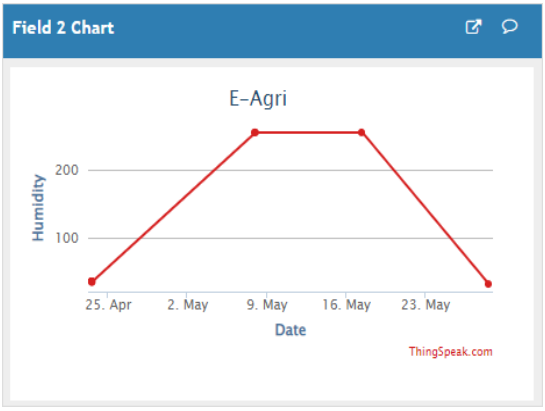

Fig: Output of thegassensor ontheweb

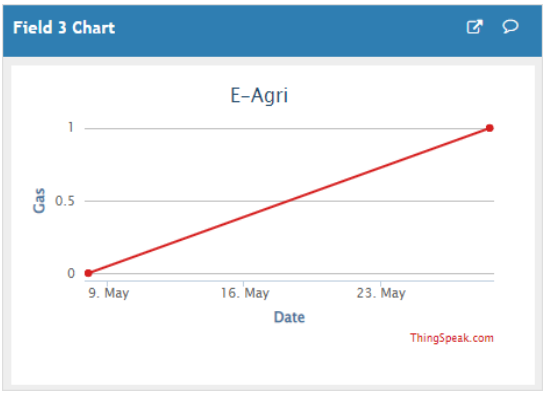

Fig: Outputofsoilmoisturesensorontheweb

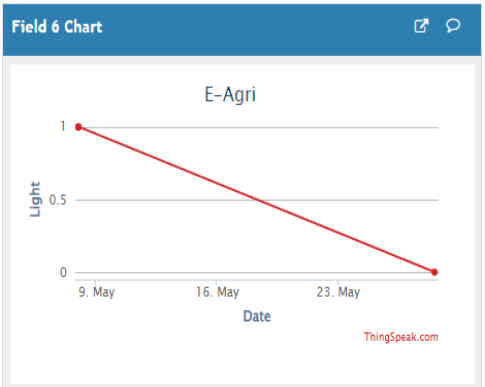

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Fig: Outputoflightsensorontheweb

Fig: OutputofIRsensorontheweb

The values from the sensors are directlysent to the web app through the internetwiththehelpofNodeMCUandRaspberryPi.Hence,byusingthethingspeakapp,afarmercangettheinformationabouthislandandcropsdirectly 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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