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IOT BASED AGRICULTURAL MONITORING USING GPS AND GSM

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ABSTRACT:

Agriculture sector in India is diminishing day by day whichaffects the production capacity of ecosystem. There is anexigent need to solve the problem in the domain to restorevibrancy and put it back on higher growth. The Concepts ofInternetofThings(IOT)areappliedtoanumberofapplications ranging from home automation to IOT, whereconnectingphysicalthings,fromanywherecriticalparametersisenhancedwithemailandshortmessagingsystem for alertsystem. Whereas, Greenhouse are controlledarea controlled area environment to grow plants. The mainaim of this projectis to design a simple, low cost, Arduinobasedsystemtomonitorthevaluesofenvironmentalparametersandthatarecontinuouslyuploadedandcontrolledin order to achieve optimum plant growth and yield. A GSM(Global System for Mobile communication) modem is usedtosendSMSwhichdisplaysthepresentstatusoftheenvironmentalparameter.Wealsousepredictionforautomatically direction and resolution of any problem in thedevices. . Various sensor nodes aredeployed at differentlocationsinthefarm.Controllingtheseparametersarethroughanyremotedeviceorinternetservices andtheoperationsareperformedbyinterfacingsensors,Wi-Fi,camera with microcontroller. IOT is a shared Network ofobjectswheretheseobjectsinteractthroughInternet.Fluctuations in rainfall or market prices can cause profits toquicklyrise or plummet. Obtaining accurate, ongoing data onoperations has historically also been a challenge. Unlike carsormicroprocessors,youcan‘tmassproduceidenticaltomatoes. Companies like Clean Grow and Slum have begunto bring Big Data to the field with tools that can dynamicallycalibrate moisture and other metrics. Between efforts to eatmore food grown locally, a younger generation of farmers andcheapercomponent-farmingisgettinganinfusionofdataandtechnology.AstheconceptoftheInternetofThingsbecomesincreasingly prevalent, many systems are being devised toallow allmannerofdatato be gathered analyzed and devices Controlled via wireless data networks.

Keywords: *IOT, Smart agriculture, humidity,Temperature, Soil moisture, Arduino*

1.INTRODUCTION:

TheInternetofthings(IOT)isthegreatestefficientandimportanttechniquesfordevelopmentofanswerthequestion.IOTevolvefromdifferentcomponentswhichincludes lots of sensors, software’s, network components andother electronic devices. Monitoring the environmental factorsisnotthecompletesolutiontoincreasetheyieldofcrops.Thereare number of other factorsthat decrease the productivity.Hence,automationmustbeimplementedinagriculturetoovercome these problems. In order to provide solution to

suchproblems,itisnecessarytodevelopanintegratedsystemwhichwillsimproveproductivityineverystage. But,completeautomationinagricultureisnotachievedduetovariousissues.

IoTare applicableinvarious

methodologies of agriculture. Applications of IoT are SmartCities,SmartEnvironment,SmartWater,SmartMetering,SecurityandEmergency,IndustrialControl,SmartAgriculture,HomeAutomation,e-Healthetc.'InternetofThings' is based on device which is capable of analyzing thesensed information and then transmitting it to the user. FromsurveyofUnitedNations-FoodandAgricultureOrganizations,theworld-widefoodproductionshouldbeincreasedby70%in2050forevolvingpopulation.Agricultureis the basisfor the human species as it is the main source of foodanditplaysimportantroleinthegrowthofcountry'seconomy.Therearemanyotherfactorsthataffecttheproductivitytogreatextent.Factorsincludeattackofinsectsandpestswhichcanbecontrolledbysprayingtheproperinsecticideandpesticidesandalso attack of wild animals and birds when the crop grows up.The crop yield is declining because of unpredictable monsoonrainfalls,waterscarcityandimproperwaterusage.Thoughitisimplementedtheresearchlevel,itisnotgiventothefarmersasaproducttogetbenefittedfromtheresources.TheIOT

technologyismoreefficientduetofollowingreasons:

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- Minimumhuman efforts
- FasterAccess
- TimeEfficiency
- Efficientcommunication

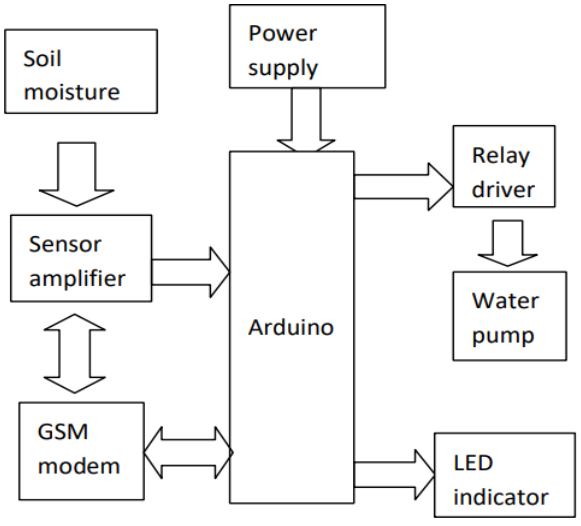

Fig1.Blockdiagramofsystem

2. METHODOLOGY:

Indian Agriculture is diverse in culture. The production variesfromplacetoplacesoforeachcroptherearecertainconditionforitsproduction.SoLackofinformationaboutthecrop,leadstofailurein production.Thissystemwillhelptoovercomethisproblem and gather all the information needed to increase itsproduction.Thefollowingsystemprovidesmonitoringplatformforagriculturalecosystembasedon IOT.Aspersystems,thecropsarebe ingmonitoredwiththehelpofArduinoboardsandGSMtechnologywhereinArduinoboardsbehaves as a microcontroller. The System purpose is to supplywater when farm is dry during absence of human, it will alsomonitor the humidity, salinity of the soil, soil moisture andtemperaturealso.ItincludesArduinoNano,NodeMCUsensors like soil moisture and Dht11, Solenoid valves, relays.Throughthe helpof internet, the control of the systemishandledandthesensorsusedintheprojectstorestheparametersintimelymanner.Thiswillhelptheusertoanalysevariousconditio nsintheplaceanytime.Thencontroltheconditions or parameter of the place properly. The paper tellsabout soil less agricultural technique where plants are grownandprovidednutrientssolutioninawatersolvent.ThistechniqueappliedisknownashydroponicswhichisfurtherintegratedwithIO Ttechnologytheresultofwhichisincreasedproductivityandthereforebyautomatingthecollection ofdataof required factors for proper nurturing of 32 crop. There is acontrolledenvironmentagriculture(CEA)thatisdesignedwiththe hardware specification and multiple sensors. The device isdesigned to analyse the environment condition and alert thefarmer uses WIFI connectivity integrated into it. Additional tothat the reading is plotted according to all the four season andthe data is sent to the user with its advantage of controlling overanywhereandanytimeallovertheworld.Thefunctionalrequirementoftheproposedsystemistomeasuretemperature,gaugehumidity ,quantifythewaterlevel,measurelightintensity,measureairtoxicitywhereasnonfunctionalrequirementareavailability,reliability,maint ainability,easeofuse. The sensor involved in the system measures the specificfactorsandnotifytheuser.Thefactorsliketemperature,moisture, light intensity, air toxicity, ph. value. There is aArduinomegadevelopmentkitwhichcontainsamicrocontroller in built and integrate all the sensor and theresult is displayed in the LCD screen moreover the system hasaWIFImodulewhichsendsthefurtherreadingfromthesensorto the user. This wireless control system for agriculture motorwhere the farmer will get notification or SMS in his mobilewhenever the motor is on and whenever it is off. The projecthasbeensuccessfulinIndiaandhelpedduringnon-deterministic weatherconditions.

3. EXISTINGSYSTEM:

Smartfarmingsystemusingsensorsforagriculturaltaskautomation Smart faming is the most appreciable conceptwhich is used nowadays to increase the productivity of thecrops or fields. The features of this paper include monitoringtemperature and humidity of the field through sensors usingCC3200singlechip.The mainidea ofthissystemistoautomatetheactivitiesoffarmingusingtheprincipleofmechanics, communication and electronics. There are twomodules namely a smart farm sensing system and a movablecrane.Thissystemconsistsofamoisturesensor,spectroscopy, optical couplers to measure the different factorsaffecting the field where as the crane consist of two mainsensors and a small irrigator through which crop growth canbe analyzed. The research goal of this system to provide asustainablesolutionforautomationofthesystem.Thesensorscollecttheenvironmentdataandallowoneto get

controloverthefieldfromtheircellphones.Thereis amicrocontroller unit (MCU) which collect data from eachsensor and when the environment changed the collected dataisconvertedtocorrectlytransmissionpattern.aftertheinformationiscompletedtheMCUwillprepareXbeemoduleand

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aserialcommunication tosendtheinformation.

BLOCKDIAGRAM

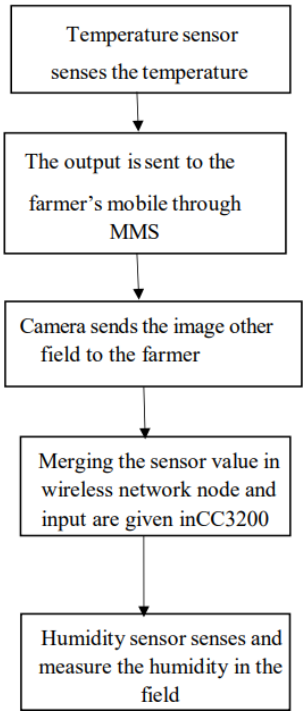

Fig-2:Blockdiagramofexistingsystem

4. PROPOSEDSYSTEM:

Proposed System deals with better production and cancellingoutallfactorsleadingtocropfailure.Theproposedsystemwillgiveresultsbasedonthenecessityofthecrops,whichwillhelptodealwiththerequirementandcrisisfacedduringcropproductivity. Measure temperature to deal with crops whichcannot bear high or low temperature. Some crops fail due tohumidity, so gauging humidity is a necessity. Estimate waterlevelsotocheckifthecropsdon'tgetsubmergedinwaterandget damaged. To display the reading in the system for user tofind optimal solution for the better production. The System tohave longer lifespan and show accurate measurement. TheSystemshouldbeeasyforupgradationsoastosimplifyintegrating components with enhanced features. The proposedsystem shouldhavethe followingaspects: Reliability: The system has longer lifespan and themeasurementsare accurate.

- Maintenance: The proposed system upgraded at ease bysimpleintegratingcomponentswithenhancedfeatures.
- Ease to use: The proposed system is easy to comprehend andgrasp.

Theusageof thesystem doesn'trequireanypriorknowledge

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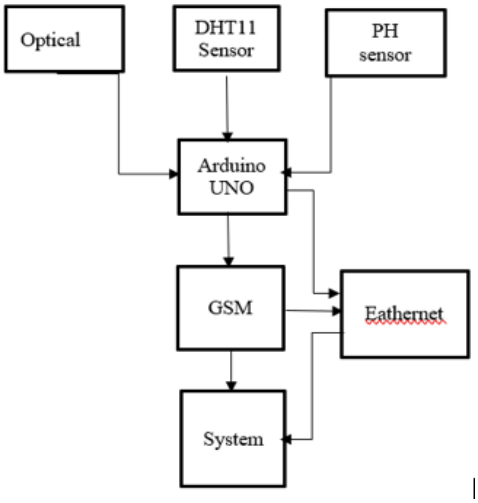
BLOCKDIAGRAM:



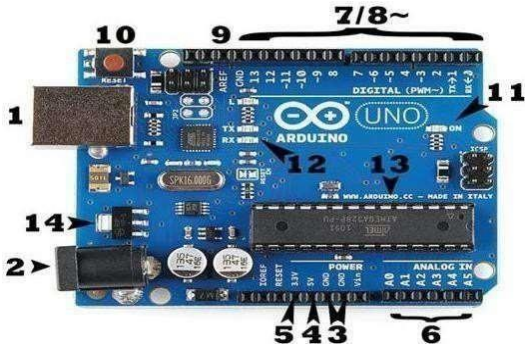


Fig.3-Blockdiagram ofproposedsystem

5. ARDUINO:

Fig-4CircuitOfArduino

There are many varieties of Arduino boards (explainedon the next page) that can be used for differentpurposes. Some boards look a bit different from the onebelow, but most Arduinos have the majority of thesecomponentsin common

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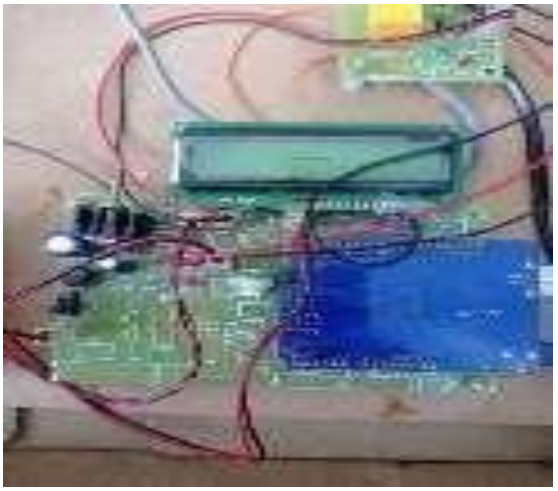

Fig.5-Arduino

6. HARDWARECOMPONENTS

6.1-DHT11sensor

DHT11 used in the paper is a basic, ultralow-cost digitaltemperature and humidity sensor. Which has a capacitivehumidity sensorand thermistor to measure the surroundingair, and spits out a digital signal on the data pin (no analoginputpinsneeded.It'sfairlysimpletouse,butrequiresverycareful timing to grab data. The only real downside of thissensor can get new data from it once every 2 seconds. ThishubwillcontinuetoexpandtocapturethesepointsofArduino, and provide depth on the impact of these issues.Arduino represents an important technology that will driveinnovative margins, from entrepreneurs and hobbyists. TheArduinoStarterKitsusestheArduinoUnoasamainboard,with the board**.** GSM, together with other technologies, ispartoftheevolutionofwirelessmobiletelecommunicationsthat includes High-Speed Circuit-Switched Data, GeneralPacket Radio System, Enhanced Data GSM Environment,and UniversalMobileTelecommunicationsService.

Fig.6-DHT11Sensor

6.2-Ethernet

Ethernetisthemostwidelyinstalledlocalareanetwork(LAN) technology. Systems communicating over Ethernetdivides a streamof data into shorter pieces calledframes,higher-layerprotocolstriggeredretransmissionoflostframes. As the OSI model, it provides services including thedata link layer.Ethernet is how a networked devices canformat data for transmission to other network devices on thesame network segment, and how to put that data out on thenetwork connection. Ittouches both Layer 1 (the physicallayer) and Layer 2(the data link layer) on the OSI networkprotocol model. Ethernet defines two units of transmission,packet and frame. The frame includes not just the "payload"of data being transmitted but also addressing informationidentifyingthephysical"MediaAccessControl"(MAC)addresses of both sender and receiver, VLAN tagging andserviceinformation,anderror-correctioninformationtodetect problems in transmission. Each frame is wrapped in apacket, which affixes several bytes of information used inestablishing the connection and marking where the framestarts. Ethernet initially assumed a shared medium: multipledevices on each segment of the network, connected daisychain at first but later in star topology via Ethernet hubs(which replicated all traffic received on any port to

everyotherport).Itthereforedefinesameansofsharingthemedium:CarrierSenseMultipleAccesswithCollisionDetection (CSMA/CD). Ethernet devices will check to see ifanyone else is transmitting at the moment (carrier sense ofmultipleaccess)andifso(collisiondetection)willwaitashorttimebeforeretryingthetransmission.Overtime,though,hubswere replaced by switches, which send to each port only thetraffic directed to the device on that port. That, combined withthemigrationfromcoaxialtotwistedpaircabling(withdedicated pairs for sending and receiving data) and opticalfiber,madeshared-mediumproblemsathingofthepast.

6.3-PHSENSOR:

PreSensfiber optic pH sensors have a measurement rangefrom 5.5 to 8.5 pH, which is perfectly suited for culturemonitoringandphysiologicalapplications.OpticalpHsensorfoils for 2-dimensional visualization of pH distributions areavailable for low pH (2.5– 4.5) and medium pH (5.5 – 7.5)range.

Fig.7- PhSensor

AllouropticalpHsensorsarepre-calibratedandcanadditionallybedeliveredeitherbeta-irradiatedoruntreated,accordingtoyourrequirements.opticalpHsensorsareoptimizedforculturemediaandphysiologicalsolutionsandcanbeappliedfrommicrolitertoproductionscale.Youcanchoose from various pH sensor designs - or disposables withintegrated sensors – to get a fiber optic pH probe that reallyfits your requirements. If you cannot find an optical pHsensor suitable for your application in our product range,just contact us! Sensor designs can be adjusted for certainapplications and we offer sensor integration in customizedhousings.FrommonitoringpHlevels insideengineeredtissue,implantationinsmallanimals, measurementsinmicro-volumesofliquids,toautomatedprofilinginsediments or biofilms, our optical pH micro sensors can beapplied in most different research fields. A further optionforopticalpHmeasurementsisourpHimagingsystem.AnopticalpHsensor foilisplacedon the sample surface or a cross section and pH distributionsandchangesovertimecanbeassessed2-dimensionally.pHimagingcangivewholenewinsights,asthousandsofmeasurementpointscanbe recordedin justoneimage.

Fig.8-ObtainedPhSensor

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7. RESULT:

Hereallthecomponentisusedforthesupplyoftherequiredcurrentfor+5V.Therearefoursensorsusedwhichare:DHT11 sensor,LDR sensor, Sol moisture sensor and PHsensor.Afan,exhaustfan,waterpump,artificiallightandmotorpumpsareattachedtotheArduinoforcoolingpurpose. So that the user can easily monitor and control theparametersthroughandroidmobileapplication.Forwhichandroidapplicationis developed.Andtheusercanalsologon the application by providing username and password forverification.Thefollowingdataoftheuseisstoredindatabase.AGSMmodemisalsousedtosendtextmessageswhichimmediatelydisplay sthecurrentstatusoftheenvironmentalparameters.DHT11sensorisusedtoanalysetheexcessoftemperatureandhumidityintheenvironmen t.Wherehightemperatureeffectstheabilityofcrops,toproducefruits.HencethewholesystemsendsSMSalerttothevariousmobile users.

Fig.9-FinalResult

8. CONCLUSION:

Thus, this system avoids over irrigation, under irrigation, topsoilerosionandreducethewastageofwater.Themainadvantageis thatthesystem'sactioncanbechangedaccording to the situation (crops, weather conditions, soiletc.). By implementing this system, agricultural, horticulturallands,parks,gardens,golfcoursescanbeirrigated.Thus,thissystem is cheaper and efficient when compared to other typeofautomationsystem.Inlargescaleapplications,highsensitivity sensors can be implemented forlarge areas ofagriculturalland.Monitoringeffortsshouldbebroadlyconceptualizedsothattheyincorporatenotonlyfarmproduction andproductivity,butalso naturalresource

8. FUTURE ENHANCEMENT OF THESYSTEM

Aninformationsystemisusuallycreatedinmodemorganizationstocatertotheinformationneedsofmanagement.Amonitoringsystemisas ubsystemofamanagementinformationsystemandhasseveraldistinguishable components. The technological rationaleforprecisionsuggestsfarmsshouldcontinuetoconsolidate,thoughinanindustryinwhichsentimentandfamilycontinuity have always played a big part that purely economicanalysis might suggest is irrational, this may not happen as fastas it otherwise would.Still, regardless of the speed at whichthey arrive, these large holdings will come more and more toresemblemanufacturingoperations,wringingeverylastounce of efficiency out of land and machinery. Such large-scalefarmswillprobablycontinuetobeservedbylarge-scalecorporationsthatprovideseeds,stock,machinesandmanagementplans.But,inthecaseofthemanagementplans, there is an opening for new firms with better ideas to nip inand steal atleast partofthemarket.

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