

Automated Irrigation System using IoT and Data Mining Algorithm.

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Abstract—automated irrigation system in order to reduce water use for agricultural crops and reduce the manual monitoring.The system has a wireless distributed network of soil moisture sensor,temperature sensor,PIR sensor,gas sensor,water level sensor.An algorithm was developed considering the temperature and soil moisture values to predict the future values.Data mining algorithm is dealing with large amounts of data obtained previously.Micro controller LPC2148 is used as control unit .The setup uses soil moisture sensors to measure the exact moisture values,temperature sensors to measure the temperature.PIR sensor detects any person moving around the field.Gas sensor detects the gases if present around the field.water level sensor has three levels low,mid and high levels.according to the level of the water present SMS will be sent to the farmers mobile.information from the sensors is directly updated to the web page.GSM/GPRS SIM800L is used.in order to measure the electricity used energy meter is setup to give the cost analysis and units used.the main aim is for optimized use of water and to predict the future values of temperature and moisture values .this is a low cost setup that reduce the effort of farmers.

Keywords- ARM 7;GSM/GPRS;Energy meter;sensors;Web page;data mining algorithm.

I. INTRODUCTION

Agriculture is important livelihood of most people in India.with the increase in population there is huge demand for agricultural production.currently the water used for agriculture amounts to 883% of the total water.this shows that there is a need to develop systems that can reduce water wastage and to use the water efficiently and further to reduce effort on farmers.In the internet era where information plays a very vital role farmers need to collect information from different sensors and machinery in order to become more efficient in production.

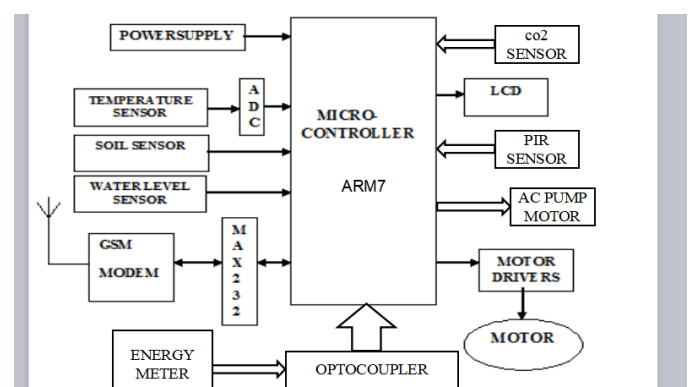
The Proposed system makes use of Micro controller ARM 7 LPC 2148 And IoT Which helps farmers to monitor the water and moisture level in the field with the help of sensors placed at the field by making farmers concentrate on other farm related works.smart farming is catching on the agricultural business.Offering high precision crop control,useful data collection,and automated farming techniques there are clearly many advantages a networked farm has to offer.

Of many advantages IoT brings to the table its ability to innovate the landscape of existing methods is groundbreaking.

IoT sensors are capable of providing information about rainfall,crop yields,pest infestation,soil nutrition provides valuable data which are required for future use.

Automated irrigation system provides both maximization of the yields and minimization of waste.

II. PROPOSED SYSTEM



COMPONENTS USED:ARM 7 micro controller,sensors like temperature sensor,soil moisture sensor,waterlevel sensor,gas sensor,PIR sensor are used,ADC converter,GSM/GPRS MODEM,MAX232,energy meter,optocoupler,motor and PUMP,LCD display.

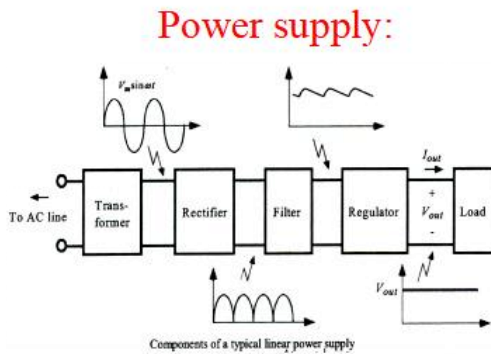
III.FUNCTIONING OF THE SYSTEM

Microcontroller ARM 7 is used which acts as a control unit,sensors like temperature,soil moisture,water level sensor,gas sensor,PIR sensor are used to collect the information from the roots of the soil.there are three water levels low,mid,high that alerts the farmer through SMS to his

mobile.the values are also updated to the webpage through GPRS facility.energy meter gives the accurate usage of the

units of electricity used.ALL the values of the sensors are shown to us on the LCD Display.Motor ON/OFF can be controlled by SMS from anywhere.

A)POWER SUPPLY:



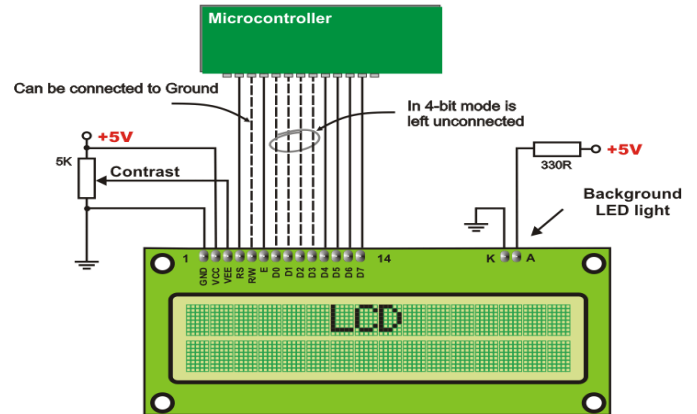
This section is meant for supplying Power to all the sections mentioned above. It basically consists of a Transformer to step down the 230V ac to 9V ac followed by diodes. Here diodes are used to rectify the ac to dc. After rectification the obtained rippled dc is filtered using a capacitor Filter. A positive voltage regulator is used to regulate the obtained dc voltage.

B)MICROCONTROLLER:

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

C).MAX 232: The microcontroller can communicate with the serial devices using its single Serial Port. The logic levels at which this serial port operates is TTL logics. But some of the serial devices operate at RS 232 Logic levels. For example PC and GSM etc. So in order to communicate the Microcontroller with either GSM modem or PC, a mismatch between the Logic levels occurs. In order to avoid this mismatch, in other words to match the Logic levels, a Serial driver is used. And MAX 232 is a Serial Line Driver used to establish communication between microcontroller and PC (or GSM).

D.)LCDDISPLAY:



This section is basically meant to show up the status of the project. This project makes use of Liquid Crystal Display to display / prompt for necessary information.

E.)Temperature sensor: Thermistors are a temperature sensing devise. It is used to sense the temperature. In this project by depends on the value of temperature the exhaust fan will run.

F.)Relay Section: This section consists of an interfacing circuitry to switch ON / OFF the system whenever any unhealthy conditions i.e. overload is detected. This circuitry basically consists of a Relay, transistor and a protection diode. A relay is used to drive the 230V devices.

G.)Water level sensor: The sensor used for measurement of fluid levels is called a level sensor. The sensing probe element consists of a special wire cable which is capable of accurately sensing the surface level of nearly any fluid, including water, saltwater, and oils.

H.)GSM: This section consists of a GSM modem. The modem will communicate with microcontroller using serial communication. The modem is interfaced to microcontroller using MAX 232, a serial driver. The Global Packet Radio Service is a TDMA based digital wireless network technology that is used for connecting directly to internet. GSM module will help us to post data in to mobile directly via SMS service.

III. EXPERIMENTAL SETUP:

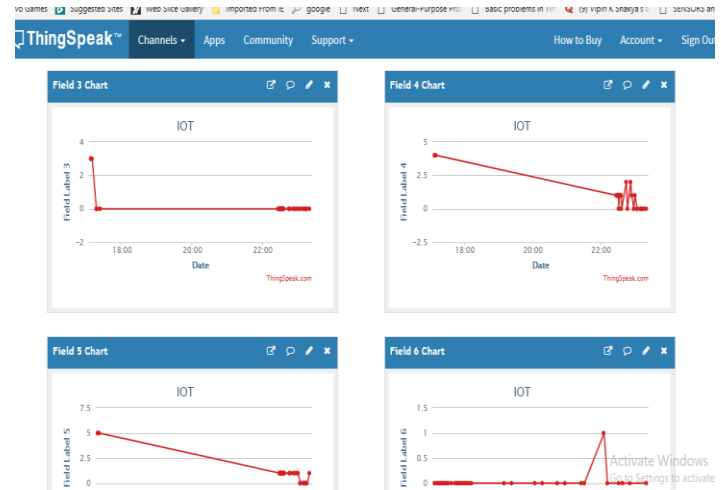
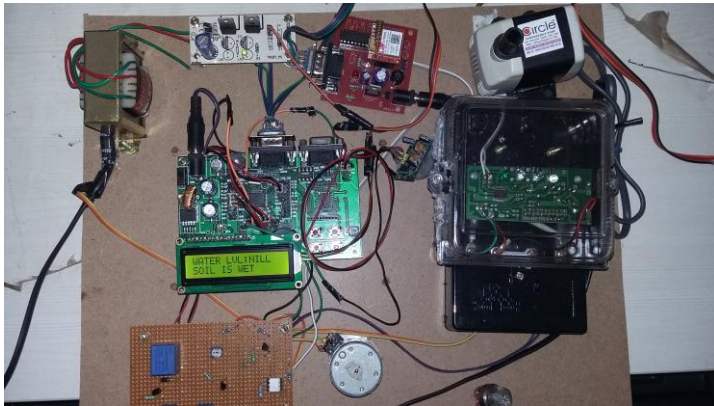


Fig2:field 3&4 chart temperature sensor values.

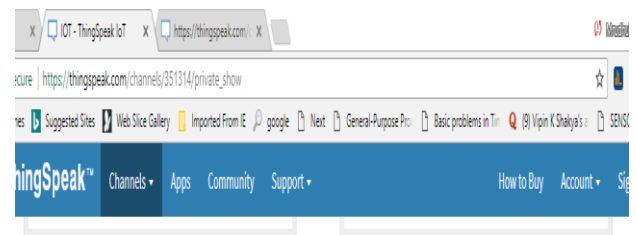


Fig 3: field 5& 6 chart values of temperature sensor.

IV. PROPOSED ALGORITHM:

- STEP1:Collect the maximum and minimum temperatures of the previous year or month.
- STEP 2:Data preprocessing
- STEP 3:Data selection and cleaning
- STEP 4:Data transportation.

V. WEB PAGE RESULTS OF DATA MINING ALGORITHM:

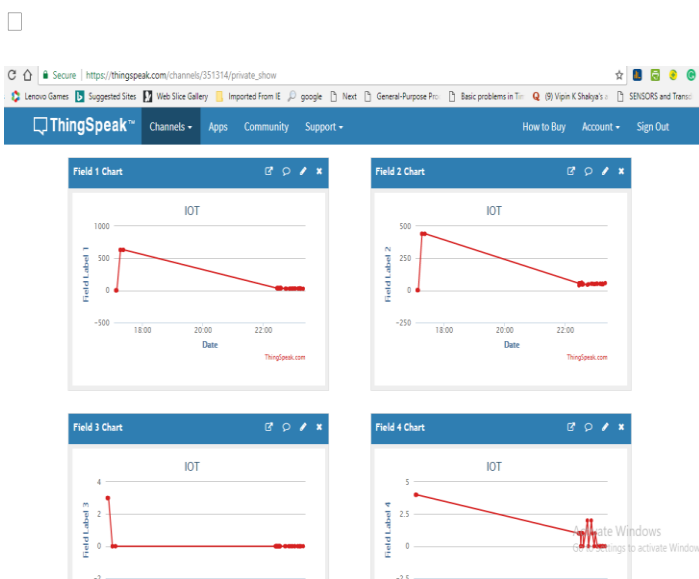


Fig1:field 1 & 2 chart with values of soil moisture sensor.



VI.CONCLUSION.

The paper proposed is the automated irrigation system which is a efficient,low cost and most advantageous and useful to meets the needs of the growing population and demand of agricultural products.As the power consumption can also be seen this maximizes the yield of each crop and reduces the wastage of water in the field.this also helpful by decreasing the manual monitoring of the field all the time as it can be controlled by farmers mobile.the data mining algorithm helps in predicting the future temperature and moisture values of the soil.this helps to stay alert and face situations that occur in the future.

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