Automatic Irrigation System by Using Internet of Things (IOT)

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Abstract- *A smart city enables the effective utilization of resources and better quality of services to the citizens. To provide services such as air quality management, weather monitoring and automation of homes and buildings in a smart city, the basic parameters are temperature, humidity and CO2. This paper presents a customized design of an Internet of Things (IOT) enabled environment monitoring system to monitor temperature, humidity and CO2. In developed system, data is sent from the transmitter node to the receiver node. This paper presents the functional design and integration of a complete WSN platform that can be used to remote environmental monitoring and target for IOT applications.*

The system of physical object devices, vehicles, buildings and other items embedded with sensors, electronics, software and network connectivity that enables these objects to collect and exchange data, this is called IOT. IOT is expected to generate large amounts of data from diverse locations. IOT is one of the platforms for today's smart city and smart energy management systems. Wireless Sensor Network (WSN) is used to monitor environmental conditions such as sound, pressure, temperature etc. The application requirements are long lifetime, low cost, fast deployment, low maintenance; high number of sensors and high quality of service are considered in the specification. Low-effort platform reuse is also considered for the specifications and design levels for a wide array of related monitoring applications.

I. INTRODUCTION

Local Area Network (LAN) is one of the most trustable wireless communication systems that can be accessed and used very easily. The price of it trans-receiver module and subscription fee of its services is very low so it is very cost effective also. Embedded system interfaced with LAN module can widen the scope of embedded design and enhanced the application areas of controlling and monitoring systems to a great extent. During the past decade network services has extended beyond speech communication to many other custom specified embedded design application.Technology is continuing to make our life better and often in unprecedented ways. This time, it is about finding a solution to the drought-ridden agriculture. Yes, you have guessed it right. Advanced technologies have arrived to offer an effective solution to various irrigation problems. What kind of technology it is and how it is going to contribute to irrigation, we are discussing all this in detail right here. The interconnected objects referred as Internet of Things (IoT) is continuing to evolve offering more control over our living environment and allowing more ease in doing things. Many consider this as the next big horizon in the evolution of the Internet. Thanks to the robust capability of collecting, storing, analyzing and distributing data among diverse interfaces, apps and devices, the freedom for real-time application of data and data-driven insights has become easier than ever before. But how this pool of data-driven insights can help irrigation? Well, it is more about obtaining the real-time information about various aspects pertaining to irrigation.

II. EXISTING SYSTEM

Global system for mobile communication (GSM) is one of the most trustable wireless communication systems that can be accessed and used very easily. The price of it trans-receiver module and subscription fee of its services is very low so it is very cost effective also. Embedded system interfaced with GSM module can widen the scope of embedded design and enhanced the application areas of controlling and monitoring systems to a great extent. During the past decade network services has extended beyond speech communication to many other custom specified embedded design application.

It proposes an innovative GSM based remote controlled embedded system for irrigation. The interface and communication between user and designed system is via SMS on GSM network if the user is within the range of 10m of designed system. India is a country of agriculture and it is backbone of Indian economy. Irrigation is heart of agriculture. Irrigation is used to assist growing crops in the field land during the in adequate rainfall period. Pesticide is used preventing, destroying or mitigating any pest. Both of these are very important for good productivity and both need time to time application in the farm field. In India approximately 20% of farmers are dependent on electric water pumps for irrigation in their field. There are many problems associated with

irrigation farmer's house so farmers have to go farm land for irrigation that causes inconvenience and fuel consumption (if used any vehicle). The farm field as the nature of supply of electricity is quite unpredictable .The instances of burning of motor due to unpredictable voltage fluctuations and dry running. In farm field. In farm field. Sprayed. These pesticides are very harmful for farmer's health. All these issues are handled in the proposed system. The system will send status of power supply via Bluetooth/SMS on GSM network to user. The system will check the water flow from the pump. If electricity is there but no water supply is available, system will send information to user via SMS on GSM network. The user sends data in the form of SMS on GSM network to start or stop the irrigation according to received information.

III. PROPOSED SYSTEM AND ITS ADVANTAGES

Local Area Networks (LANs) are expected to constitute one of the largest segments in the market for wireless products. Wireless Local Area Networks will facilitate ubiquitous communications and location independent computing in restricted spatial domains such as offices, factories, enterprise facilities, hospitals, and campuses. In such environments, LANs will complement and expand the coverage areas of existing wired networks. The main attractions of LANs include: cost effectiveness, ease of installation, flexibility, tether-less access to the information infrastructure, and support for ubiquitous computing through station mobility. One particular advantage of LANs is the fact that they can be quickly installed in an Ad Hoc configuration by non-technical personnel, without pre- planning and without a supporting backbone network.

An accurate and synchronized clock time is crucial in many sensor network applications, particularly due to the collaborative nature of sensor networks. For example, in target tracking applications, sensor nodes need both the location and the time when the target is sensed to correctly determine the target moving direction and speed. However, due to the resource constraints on sensor nodes, traditional clock synchronization protocols (e.g., network time protocol (NTP) cannot be directly applied in sensor networks. Wireless sensor networks have been the object of intensive interest in the research community, Inexpensive, smart nodes with multiple on-board sensors, networked through wireless lines as well as the Internet and deployed in large numbers, interact intelligently with the physical world. These systems are aimed at various applications: environmental, medical, food-safety, and habitant monitoring; assessing the "health" of machines, aerospace vehicles, and civil engineering structures; energy management; inventory control; home and building automation; homeland security; and military initiatives. One important set of applications involves monitoring diffusion phenomena.

Advantages:

Resource Sharing:

Computer resources like printers, modems, DVD-Rom drives and hard disks can be shared with the help of local area networks. This will reduce cost of hardware purchases.

Software Applications Sharing:

It is cheaper to use same software over network instead of purchasing separate licensed software for each client in a network.

Easy and Cheap Communication:

Data and messages can easily be transferred over networked computers

Centralized Data:

The data of all network users can be saved on hard disk of the server computer. This will help users to use any workstation in a network to access their data. Because data is not stored on workstations locally.

Data Security:

Since, data is stored on server computer centrally, it will be easy to manage data at only one place and the data will be more secure too.

Internet Sharing:

LAN provides the facility to share a single internet connection among all the LAN users. In Net Cafes, single internet connection sharing system keeps the internet expenses cheaper.

IV. BLOCK DIAGRAM OF IRRIGATION SYSTEM

A block diagram is a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks. They are heavily used in engineering in hardware design, electronic design, software design, and process flow diagrams.

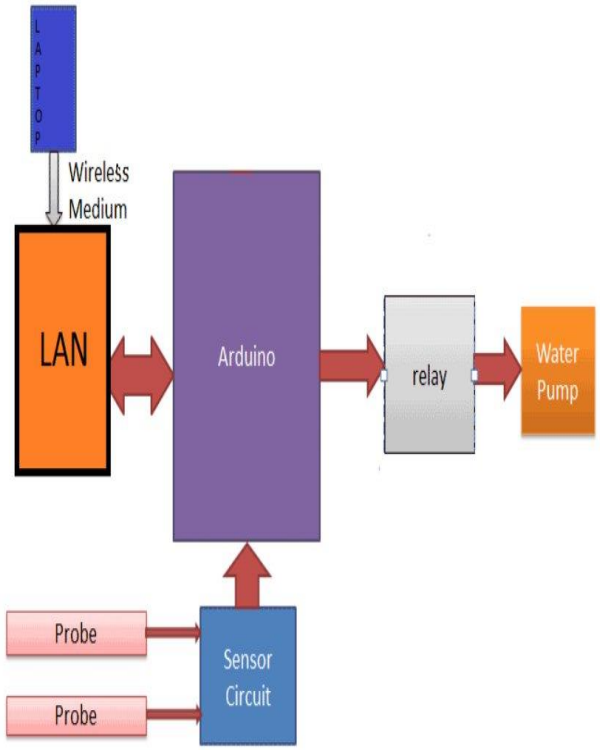


Figure : Block Diagram of irrigation system

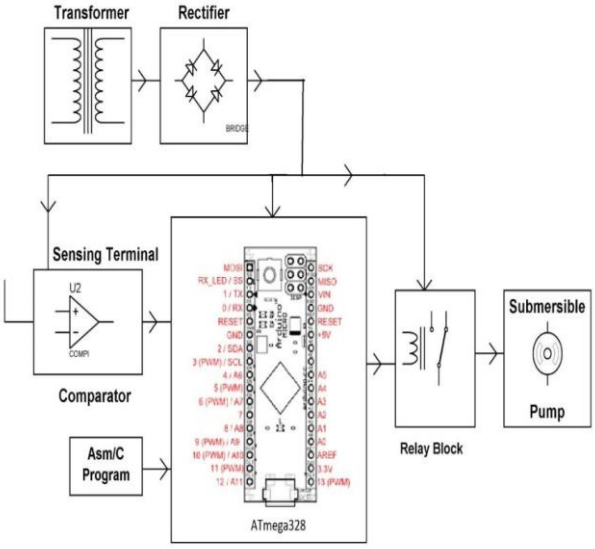
Working:

In the LAN based irrigation system here 28-pin microcontroller is used which is known as Arduino. Arduino has 13-digital pins and 6-analog pins and it works on 12V D.C, then we interface arduino with LAN cable here transmitter of arduino is connected with receiver of LAN cable and receiver of arduino is connected to transmitter of LAN cable. Here the sensor used which is moisture sensor. Moisture Sensor is use to show the presence of water in soil which is used for irrigating crops.

According to our coding, if any value is increase between these sensors then it gives alert to us in the form of "alert" tour number through LAN cable. Driver circuit is connected to the pin number 9 of the arduino and it is consist of resistor of 10k which is connected to the NPN transistor which is connected to diode and relay of 12V and these relay is used to drive a water pump.

CIRCUIT DIAGRAM OF IRRIGATION SYSTEM:

It represents how the components are connected to each other and the connections should be done in a proper way, misplacement of connection leads to error in output.

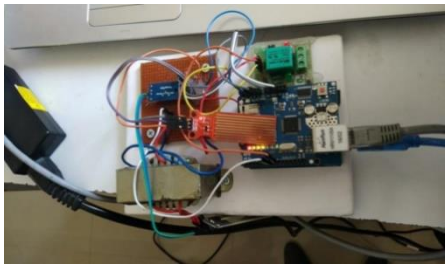


Circuit diagram of irrigation system

V. RESULT

Initially , connect the ethernet cable and USB cable to the ARDUINO board. Once the connection is established the LED's present on the board starts glowing. This indicates that all the connections are correct. Establish the bridge connection by selecting Wireless Network Connection and Local Area Connection in network settings. It provides internet to the arduino board for message alerts. Once the bridge connection is established, open the arduino IDE software and then dump the program to the board and it starts compiling. If any errors presents they will show at the bottom of the screen. Check for the connection between transmitter and receiver (Laptop or mobile phone). If connection establishes it shows connected 1(logic symbol), if there is a problem because of network speed it shows connection failed. When the moisture in the soil is below the reference level the green LED starts glowing, it is the symbolic representation of its time to watering the plant. For reference place the soil moisture sensor and water level sensor in water, both are inversely proportional to each other.

Open the phpMyAdmin website in the laptop connected at the receiver. Choose IOT and then samples, once the sensors are placed in the water the readings are shown continuously due to the variations in the moisture levels. Here w=0 indicates no water content in the soil. p=1 indicates that sensors are working. Observe that when s=1023, w=0 means when moisture in the soil is adequate no need to supply of water.



VI. CONCLUSION

There is an urgent need for a system that makes the agricultural process easier and burden free from the farmer's side. With the recent advancement of technology it has become necessary to increase the annual crop production output of our country India, an entirely agro centric economy. The ability to conserve the natural resources as well as giving a splendid boost to the production of the crops is one of the main aims of incorporating such technology into the agricultural domain of the country. To save farmer's effort, water and time has been the most important consideration. Hence systems need to be designed to provide this ability efficiently using wireless sensor networking, sprinkler irrigation, LAN, SMS technology, The result of the survey conducted has lead to a very positive approach on the impact of LAN technology in farm irrigation methods and techniques. The approaches studied had various pros and cons in the time required for operations or complexity or feasibility and user interactions. With technology advancing everyday new techniques have been implemented for further minimizing the irrigation process like using prebuilt mobile phone or standalone application software for conduction the irrigation process.

FUTURE SCOPE

It has enormous potential and may be used in various other ways, due to its cheap and cost efficient design. It can be used as a home automation controller, by adding a few more 240 volt relays. By using automatic controllers one can remotely perform jobs.

Another way is used as a float switch in a tank, so that the system automatically shuts the pump down, once the reservoir is full. Implementing this technology by using solar panel avoids the usage of power from transformer, this one can save the power, so that the entire system is eco-friendly.

By adding LDR which is nothing but a Light Dependent Resistor which mainly used for smoke detection, automatic lighting control, burglar alarm system and batch counting. LDR have a particular property in that they remember the lighting conditions in which they have been stored. This means the effect can be minimized by storing the LDRs in light prior to use. Light storage reduces equilibrium time to reach steady resistance value. So one can easily identify the amount of light requirement for effective plant growing.

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