FARM CULTURE THROUGH IOT AND EMBEDDED LINUX HIGH END PROCESSOR

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ABSTRACT:

The machine supplies a web interface towards the user so the user can control and monitor the machine remotely. Within this paper, Raspberry Pi can be used being an embedded Linux board that is designed in line with the arm 11 microcontroller architecture. This paper presents an automation of farm irrigation system utilizing a wireless sensor network and embedded Linux board. Embedded Linux board helps make the communication with all of distributed sensor nodes put into the farm through ZigBee protocol and itself behave as a matched node within the wireless sensor network. Each sensor node includes soil moisture and soil temperature sensor and something ZigBee RF antenna device for communication using the coordinator node. The aim of coordinator node would be to collect the parameters like soil moisture and soil temperature wirelessly. Raspberry Pi stores collected data within the database and evaluates the stored data. The machine works based on the formula produced for watering the crop. The machine will lessen the water consumption and providing uniform water towards the crop leads to growing yield. The board comes with an Ethernet interface and runs the straightforward data server. Hence coordinator collects the information over ZigBee wireless communication protocol and permit user to watch the information from the internet browser. User could make the irrigation system off or on remotely.

Keywords: Wireless   sensor   network; Raspberry Pi, ZigBee; Embedded Linux.

I. INTRODUCTION

There's challenging before every country to sustain the new food requirement and lowering the farm water consumption. Irrigation is the procedure of watering the earth. Agriculture may be the worldwide prime occupation of individual, available land is occupied through the agriculture, and also it consumes eighty five percent of accessible freshwater. This figure water consumption increases each year because of globalization and population growth. The advantages of water towards the soil are dependent on soil qualities like soil moisture and soil temperature. Additionally, it is dependent upon the crop which develops within the soil [1]. From last decade, couple of existing system employed by lowering the agriculture water consumption, however these systems possess some restrictions. Scalping strategies, watering is completed without examining the earth qualities, with the result that systems apply non uniform water towards the soil leads to fewer yields. Also systems needed more human technology to solve this issue and support better irrigation management. For we have suggested system that is Internet based automatic irrigation system using wireless sensor network and embedded Linux board. The wireless sensor network produces the systems of multiple products getting able to computation, communication and sensing. It possesses a bridge between your real physical world and virtual mobile phone industry's and getting an array of potential programs of Agriculture, home automation, science, civil infrastructure and security. Within this suggested system WSN is includes two nodes, coordinator node and Router/Finish device node. Each node mainly includes memory, processor as well as an RF transceiver. The coordinator node is dependent on Raspberry Pi (Rpi) embedded Linux board and Finish device is dependent on Arduino 1 Atmega328 platform. The part from the coordinator node within the product is to initiate the communication with distributed Finish device nodes through the ZigBee wireless communication protocol and continuously collects the earth moisture and soil temperature data and store collected data within the database. The database is produced around the raspberry Pi board that is a MySQL database. Coordinate node

evaluates the received data and decides water needed for that soil. When the examined data implies that water is needed, the coordinator node transmits instructions to push controller make Irrigation on. Rpi comes with an Ethernet interface also it runs an easy data server. Hence coordinator node enables data collection over ZigBee and knowledge monitoring and system control from internet browser remotely.
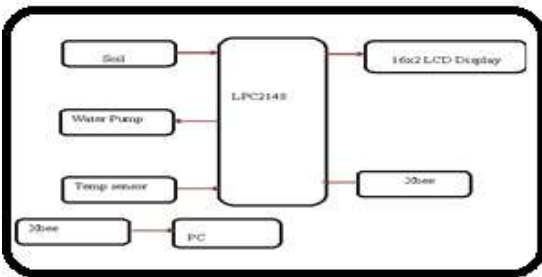

Fig.1. Block Diagram of Irrigation System

II. PROPOSED SYSTEM

Coordinator node manages the multiple Router/Finish device nodes. The machine includes three parts Coordinator node, Router/Finish device sensor node and server design. Coordinator node and Finish device sensor node is related by radio transceiver. It'll allow transmitting soil parameter data from Finish device sensor node to coordinator node and controlling signal from

coordinator node to push node. The wireless communication is dependent on ZigBee protocol it uses 2.4 GHz wireless link. The net server was created on Rpi for monitoring and controls the irrigation. Any products that have the capacity to gain access to the net service are going to be used for monitoring the information like PC, laptop, smartphone etc. Within this suggested system we've used Raspberry Pi because the controller of coordinator node. Rpi may be the small, affordable minicomputer. It continuously collects the data send by sensor nodes via ZigBee, and processing large amounts of information timely and readily available for customers to see. It's the core from the system. Sensor node used here to sense the earth parameters. It's designed using Arduino 1 microcontroller board according to Atmega 328. It contain the ZigBee protocol based radio transceiver, power unit, soil moisture and soil temperature Sensors, and knowledge logger for temporary storage. It'll sense the earth parameter typically at one-minute times and send to the coordinator node through the ZigBee wireless communication protocol. A ZigBee protocol for wireless communication

which is dependent on the actual protocol IEEE 802.15.4, which defines the network physical layer, and controlling layer for media access, while ZigBee protocol defines the network layer, application layer and specifications from the network security services [2]. Within this suggested system we've designed the database according to MySQL which is a component of Rpi. MySQL may be the popular selection of database inside a web application. MySQL may be the relational database management system. It's open source. Database stores the earth parameter information send with a sensor node inside it as time passes. It offers the data to the net page for monitoring the machine remotely. The DS1822 requires just one data line (and ground) for communication having a central micro-processor. Each DS1822 includes a unique 64-bit serial code, which enables multiple DS1822s to operate around the 1-Wirebus thus; it is possible to play one micro-processor to manage many DS1822s distributed on the large area. Programs that can usually benefit from this selection include temperature monitoring systems inside structures, equipment or machinery,

and process monitoring and control. The module includes recognition probe, and sensor board. It's getting triple output mode, digital, analog, and serial with exact blood pressure measurements. The sensor will identify the moisture from the soil surrounding it, i.e. lack of water content from the soil. When the contents are low the module output is going to be high otherwise the output will stay in neutral conditions. This moisture sensor has two probes accustomed to pass the present in to the soil, after which it reads that resistance between two probes to obtain the level of moisture. More water contained in the earth helps make the soil conduct electrical current easier indicate less resistance, while dry soil getting less water conducts electricity poorly indicate more resistance [3]. The Raspberry Pi may be the inexpensive credit size minicomputer that has lately gain popularity. The Raspberry may be the least expensive low power arm 11 based microcontroller operating at 700MHz frequency and getting the 512 mb of Random access memory. Arduino includes a microcontroller and Integrated Development Atmosphere. IDE

can be used to create and upload computer code towards the microcontroller.

III. METHODOLOGY

Each sensor node consists of one soil moisture and soil temperature sensors, and something ZigBee transceiver. The programming around the Arduino board is really method in which after every minute sensor node transmits soil parameter data to coordinator node through the ZigBee wireless communication protocol [4]. We deploy the 2 sensor node separated from one another. The space backward and forward nodes is dependent on the kind of soil means when the soil getting exactly the same water holding capacity needed just one sensor node. The XBee transceiver device includes a unique 64 bit serial address and 16 bit personal area network address (PAN). Coordinate node consists of XBee transceiver, database, and Server. It collects the sensor data continuously and stores it inside a MySQL database. Two sensor nodes never transmit the information concurrently, since the ZigBee protocol getting the mechanism of collision recognition. The python-serial programming

can be used in raspberry Pi to spread out the serial port attached to the XBee tool and read data regarding this. Python script continuously reads the information store in MySQL database and concurrently examining the threshold value for irrigation. If sensor data crosses the brink value coordinator node transmits instructions towards the push node for irrigation. The net server was created around the Rpi. It is dependent on Apache open source. It offers the net interface towards the user to watch and control the machine remotely. Coordinate node is definitely running mode while Finish device after every minute using sleep mode. XBee device water pump node set like a router getting the destination address from the coordinator node [5]. The consumer has access to the machine status utilizing an access to the internet device like pc, laptop, and wise phone. We've used XBee pro S2 within our system. The XBee system is following the rule of IEEE 802.15.4 wireless communication protocol. It props up mesh, and indicate point network. It´s getting an inside or city 300 foot. (90m) range and outside type of sight 3200m range. It supports sleep way of

lowering the power consumption. Within our system Rpi connected XBee device set as coordinator and sensor connected XBee device set being a Finish device.

IV. CONCLUSION

The machine is watering towards the crop uniform by examining the earth parameters; it can help to lessen the freshwater consumption. By supplying the net interface and automation user can certainly monitor the machine and it'll minimize a person's intervention. This paper designs the automated wireless irrigation system using WSN and embedded Linux board. Within this we've used raspberry Pi being an embedded Linux board which enables collecting the sensor information from sensor node continuously, store it inside a database and supplying the net interface towards the user. The ZigBee protocol can be used for wireless communication it'll create network easily and mixture of Arduino, XBee and sensor produce a low power affordable sensor node. The Apache server crated on Raspberry Pi easily exhibiting the items in sensor data.

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