ARM Based Easy water Distribution and Data Recording System

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***Abstract*—** ARM based easy water distribution system is used to distribute water from centre system. This system includes various sensors like humidity sensor, water level sensor and moisture sensor. Humidity sensor is used to measure humidity of environment at field and there is another sensor to measure water capacity in the tank. These sensors are attached with the raspberry pi board. These sensors sense the data and automatically send it to central controller. System has capability to control water pump to release water in farm but when after some threshold level reached in water tank. Sensors at field continuously send the data to central system. This central system monitor the data related to water and humidity and send the water whenever it required on the field .In this System no user interaction required directly. These all sensed data are recorded at central system and user can monitor this data whenever he wants in future. This System helpful to automatic management of water distribution and monitoring of it and it also saves the time and water. This is an embedded system.

Keywords *- Base farm, Raspberry Pi, Sensors, Water Pump, Relay, Wi-Fi Module, Router, Qt-creator.*

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I. INTRODUCTION

To provide sufficient but no more excessive water to each and every place of farm is necessary in the distribution of water supply to grow crop at optimal level. Today Present systems have many problems like, use of those systems and maintenance of systems. Due to that problems of those systems are costly and unreliable. So, we are going to make easy use of this system and at less cost.

ARM based easy water distribution system is to transport potable water from a water treatment facility to every crop. ARM based easy water distribution system is used to distribute water from centre system. This system includes various sensors like humidity sensor, water level sensor and moisture sensor. Humidity sensor is used to measure humidity of environment at field and there is another sensor to measure water capacity in the tank. These sensors are attached with the raspberry pi board. These sensors sense the data and automatically send it to central controller. System has capability to fill the tank by water after some threshold level reached. Sensors at field continuously send the data to central system. This central system monitor the data related to water and humidity and send the water whenever it required on the field .In this System no user interaction required directly. These all sensed data are recorded at central system and user can monitor this data whenever he wants in future. This System helpful to automatic management of water distribution and monitoring of it and it also saves the time and water. These two figures are about Easy water distribution and recording system. This system about easy water distribution and saving data for future use.

In farm when soil will be going to dry at that time our system sense dryness via moisture sensor and it gives (transmits) information to raspberry pi b+ board via Wi-Fi device. Then that board gives order to relay circuit for start water pump and release water in farm for watering to crops and maintain flexibility of soil for them.

A Base farm is based on an application which extracts the data from TCP/IP protocol. The entire communication system is based on TCP/IP protocol which is a standard implemented By almost all the systems. It provides a static link between measurement unit and base station based on IP addresses.

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II. PROPOSED WATER DISTRIBUTION SYSTEM ARCHITECTURE

This proposed system is divided into two parts such as a farm part and second is a home part with embedded Qt Creator application. Fig. 1 and 1.1 shows an overview of this proposed system.

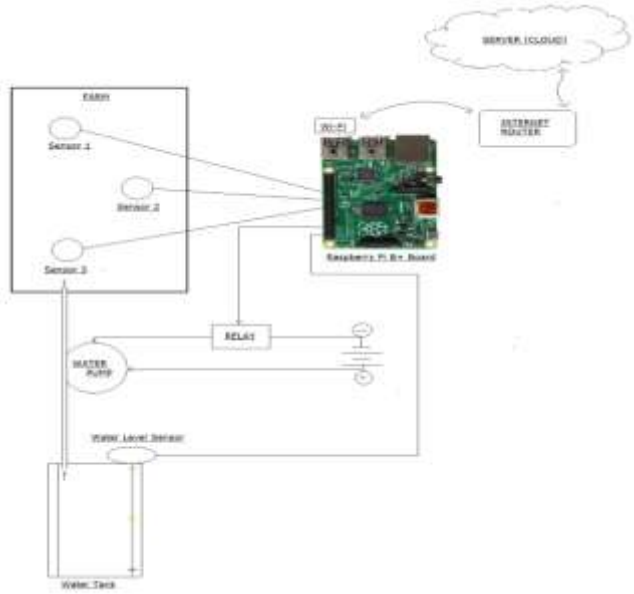

Figure 1: Overview of Proposed system (Farm part)

 ISSN: 2321-8169
2716 - 2719

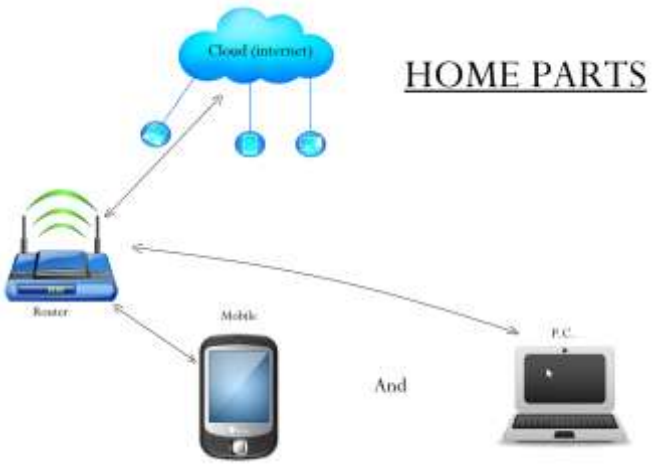

Figure 2: Overview of Proposed system (Home part)

The whole hardware system can be divided into few parts. The first part is about farm side components, Raspberry pi board connected with Wi-Fi module, Water pump connected with Relay CKT box, Moisture sensors and water level measuring sensor and one router for access the machine for any where any time. And we can also give order to it. The second part is nothing but our own home for examples or anywhere to you can check the own machine's status. It is successful communication if received data is same as transmitted data. These all parts work together in the whole process. The main software design work is focus on the Raspberry Pi. All the hardware environments are set up on raspberry pi board. Data communication by Wi-Fi is done in Raspberry Pi with Raspbian OS (Linux) environment by using Wi-Fi protocol stack. As this project is embedded programming and interface oriented and conceptual level so we have selected this hardware.

The whole software design work can be divided into two parts which are one from server side and other from client side. Here Raspberry Pi is used as server with Wi-Fi Connectivity and any mobile and PC used as client. There are also tree parts in programming like main working loop, collect sensor data on Raspberry Pi and transmit that data over Wi-Fi to server means read this data from remote pc etc. Any time person can show how much water is available in tank or farm having water or not all things. Here we write all the programs in C. In the outcome of the test, we can see that the data collection system can work properly and transmit the data to the remote PC wirelessly through the Wi-Fi router. With this kind of design, the data collection system can finish the work no matter what kind of the water distribution is.

Also we designed GUI application in Qt Creator; Qt Designer is the Qt tool for designing and building graphical user interfaces (GUIs) with Qt Widgets. You can compose and customize your windows or dialogs in a what-you-see-is-what-you-get manner, and test those using different styles and Resolutions. Widgets and forms created with Qt Designer integrate seamlessly with programmed code, using Qt's signals and slots mechanism, so that you can easily assign behavior to graphical elements. All properties set in Qt Designer can be changed dynamically within the code. Furthermore, features like widget promotion and custom plugging allow you to use your own components with Qt Designer.

III. DESIGN & IMPLEMENTATION

This system design into two parts:

A. Hardware Design

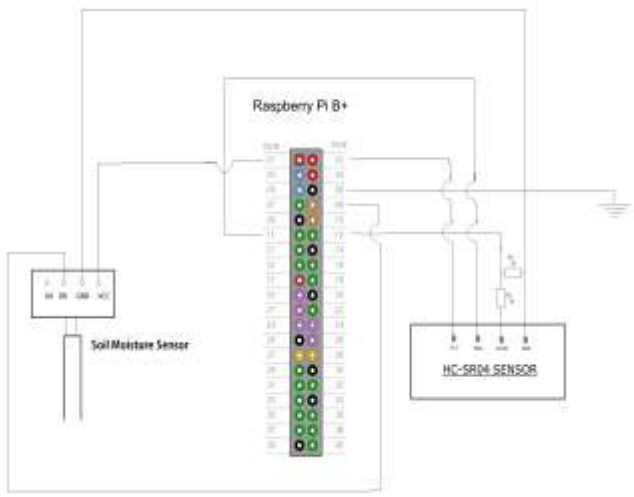

Figure3: Schematic of System (Sensors)

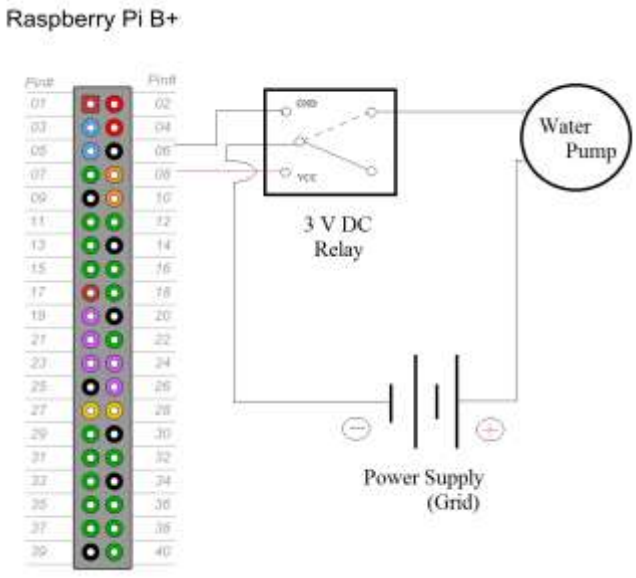

Figure 4: Schematic of System (Relay and Pump)

ISSN: 2321-8169
2716 - 2719

The raspberry pi is a credit sized, low cost and single board computer, it is advanced by raspberry pi foundation in the UK. It is controlled by Raspbian Linux OS optimised for the ARM architecture. It has five models model A, model A+, model B, model B+ and latest model Generation 2 model B.The Model B+ has 512 MB RAM, Broadcom BCM2385 ARM11, 700 MHz low power System on chip CPU. Dual core Video core IV GPU and 4 USB 2.0 ports with up to 1.2A Output.

Figure 5: Raspberry Pi B+ Board

The various sensors are connected with Raspberry pi board. Ultrasonic range HC-SR04 sensor to measure water level in water tank. Soil moisture sensor for detect moisture in farm. These sensors are continuous measure that data and it is sending continuously to our raspberry pi and that measured data is saved in a text file at regular time interval.

B. Software Design

And we used in this project Raspbian OS for raspberry pi board and for own GUI application we used Qt-creator software.

In this paper user interface is designed in Qt Creator. It is popular Graphical User Interface that used in embedded Linux as well as Windows. Qt Creator is free and open source software. All editions support many compilers and debuggers, including the Visual Studio suite and the GCC C++ compiler. Qt is a cross-platform application framework that is widely used for developing application software with a GUI and used for developing non-GUI programs such as command-line tools and consoles for servers.

Qt for Embedded Linux is a C++ framework for graphical user interface and application development for embedded devices. Qt for Embedded Linux provides the standard Qt Application program interface (API) for embedded devices With a lightweight Graphics system. Qt is a cross-platform application and UI framework for writing web-enabled applications for mobile, desktop and embedded operating systems.

Now this application shown water capacity in water tank, water status like ON or OFF and moisture sensor report like how many has water and how many out of water.

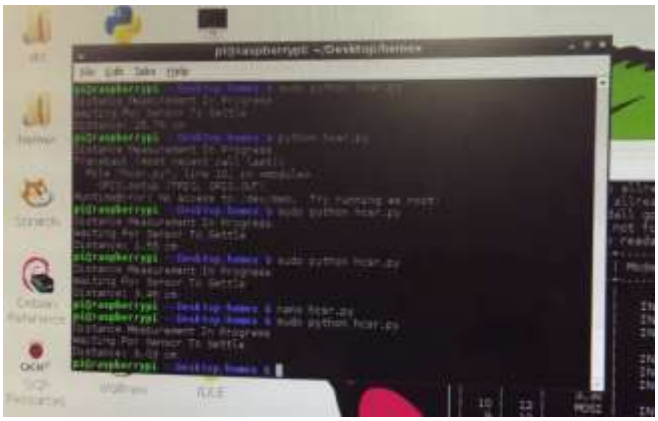

Figure 6: Output of HC-SR04 Sensor

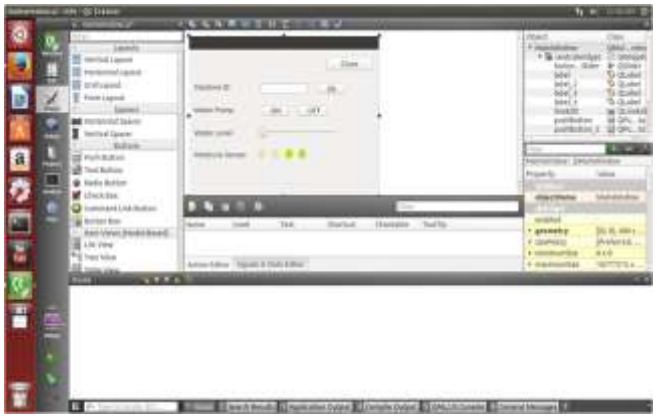

Figure 7: Complete GUI application for water distribution system

IV. CONCLUSIONS

The embedded technology is developing very fast today. And this system design, size GUI application is very helpful and important for it. This study make easy of water distribution and reduce hard work in farming and saving time and water for other work. It develops a measurement system and GUI application based on Qt Creator/Embedded that shows the measured data in application window. Furthermore, it is providing control of water pump for watering in farm. Also, it shows our sensors data. It is possible to use for Know current status of system and providing real-time data useful for control it. Through this system, users can easily understand this system and use of this system is also easy. Here data transmitted by wireless way, so there is no issue for interface. So farmer will feel relax in farm for watering and they will save water and time for other work.

ACKNOWLEDGMENT

In engineering one of the best ways of studying is, while doing project, since it helps the practical knowledge of the subject, which can be achieved successfully by putting efforts in making it successful with co-operation of teacher. I would like to express our best regards to my project guide Mr.Amol Borole whose valuable guidance, encouragement, and

provision of necessary facilities made this work possible. I would like to express our special thanks to Mr. Amol Ashok Borole, for giving us an opportunity to work. He is always ready with his invaluable suggestions through his sheer perseverance.

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