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Dynamic Water Quality Monitoring System

P.SaiGeethika[1], Sharad Kulkarni[2]
[1]PG Scholar, [2] Professor , Dept of ECE,Audisankara College of Engineering & Technology (Autonomous), Gudur, Nellore, Andhra Pradesh.

Abstract*: This paper presents a low cost and holistic approach to the water quality monitoring problem for drinking water distribution systems as well as for consumer sites. Our approach is based on the development of low cost sensor nodes for real time and in-pipe monitoring and assessment of water quality on the fly. The main sensor node consists of several in-pipe electro chemical and optical sensors and emphasis is given on low cost, light weight implementation, and reliable long time operation. Such implementation is suitable for large scale deployments enabling a sensor network approach for providing spatiotemporally rich data to water consumers, water companies, and authorities. Extensive literature and market research are performed to identify low cost sensors that can reliably monitor several parameters, which can be used to infer the water quality. Based on selected parameters, a sensor array is developed along with several micro systems for analog signal conditioning, processing, logging, and remote presentation of data. Finally, algorithms for fusing online multi sensor measurements at local level are developed to assess the water contamination risk. Experiments are performed to evaluate and validate these algorithms on intentional contamination events of various concentrations of escherichia colibacteria and heavy metals (arsenic). Experimental results indicate that this inexpensive system is capable of detecting these high impact contaminants at fairly low concentrations. The results demonstrate that this system satisfies the online, in-pipe, low deployment-operation cost, and good detection accuracy criteria of an ideal early warning system.

I. INTRODUCTION

Water supply, a routine daily service. Managing such supply makes efficient usage of natural resource of water and avoids wastage of it as well. Management system merges communication, network, internet and integrated technology together to bring development in field of supply-demand of available resource. Emerging updation in technology opens the world of novel ideas. It allows access of information via internet over network quickly and accurately at any time. Exchange of information can be analyzed and decisions are taken accordingly. Reliable water management by data acquisition is always needed of consumers. To understands the requirement of consumers and suppliers, data acquisition provide them better services, economic benefits, security, safety and convenience of accessing these services. Real time water management system for water supply implements modern technology. Monitoring and controlling of the system using internet based technology makes it easier to get data and also beneficial for presentation using standard web browser .Data acquiring through remote places, unmanned control and monitoring of system is done through various types of method . Monitoring and controlling of several devices attached can be done through variety of communication methods such as wireless LAN technology, dial-up modems, private network, satellite communication, Internet, cellular network and so on .Today data collection and monitoring from remote and unmanned location Water is need of life. In co-operative society, office and likewise system require water supply every day. Such system management of water supply using dynamic IP based Embedded Web server (EWS) is presented in this paper.In current era of networking, to maintain EWS with static Internet Protocol (IP) is costly and difficult to manage. Novel approach of assign dynamic IP to board is developed and tested for different dynamic IPs. Dynamic IP is obtained for embedded board by enabling General Packet Radio Service (GPRS) of USB data card through point to point protocol daemon (PPPd). The embedded system consists of Advanced RISC Machine (ARM) processor running on Linux operating system, USB data card and a Very secure file transfer protocol

II. EXISTING SYSTEM

Drinking water utilities are facing new challenges in their real-time operation because of limited water resources, intensive budget requirements, growing population, ageing infrastructure, increasingly stringent regulations and increased attention towards safeguarding water supplies from accidental or deliberate contamination.

There is a need for better on-line water monitoring systems given that existing laboratory-based methods are too slow to develop operational response and do not provide a level of public health protection in real time. The aim of this project is to get a fully functional single board computer (SBC) working with custom built monitoring software that communicates with all modern devices. It should be capable of extracting the necessary data from the control unit in order to use it in a meaningful and useful way. Communication to and from the CU will be done using the Onboard Diagnostics. Generally, in industries it became difficult to

access data of every machine manually.

III. PROPOSED SYSTEM

In the proposed method we overcome the drawback present in existing system by monitoring sea water quality. Our approach is based on the development of low cost sensor nodes for real time and in-pipe monitoring and assessment of water quality on the fly. The main sensor node consists ofturbidity, PH sensors and level sensor are the biological indicators of water eutrophication. And with the help of these parameters we can monitor the water quality. From the sensor node we are sending monitored values to control room (ARM board) through RS232 serial cable. The serial cable is connected to one of UART port of ARM board. The controller transmits the data to remote PC through internet by using FTP. FTP is a protocol through which users can upload files from their systems to server. Once data is placed at server we can view the data at remote PC (with internet) on web page with unique IP address. We can view continuously senor's data. With the help of sensor node, we can monitor the amount of total suspended solids using turbidity sensor, and hydrogen ion concentration using PH sensor and detecting the level of water with the help of water level sensor. If the level sensor values decreases beyond the range then motor will automatically start and if level sensor values increases beyond the range then motor will automatically become OFF. In some cases if we want to start the motor manually then also it is possible.

Block Diagram

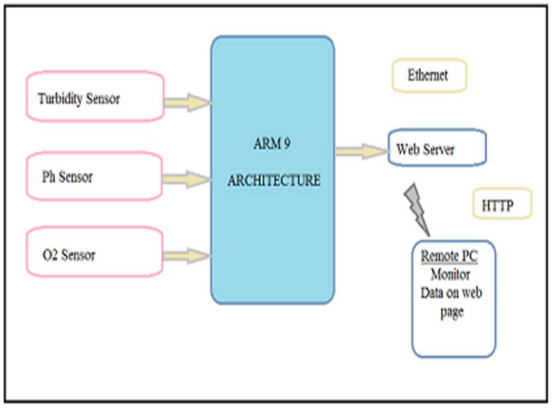

Fig1: Block diagram of proposed diagram

IV. SENSORS

A. Turbidity Sensor

They measure suspended solids in water, typically by measuring the amount of light transmitted through the water. They are used in river and stream gaging, wastewater and effluent measurements, control instrumentation for settling ponds, sediment transport research, and laboratory measurements.

B. Ph Sensor

The Model PHE-45P pH Sensor measures the pH of aqueous solutions in industrial and municipal process applications. It is designed to perform in the harshest of environments, including applications that poison conventional pH sensors. All seals are dual o-ring using multiple sealing materials. The sensor is designed for use with the Omega PHTX-45 Monitor/Analyzer.

C. Level Sensor

It is used to measure the water level .If the water level reaches the maximum value then the DC motor is turned OFF automatically .If the water level reaches the minimum value then the DC motor is turned ON automatically.

D. Dc Motor

The most common actuator in mobile robotics.simple, cheap, and easy to use.come in a great variety of sizes, to accommodate different robots and tasks .DCmotorsconvert electrical into mechanical energy.They consist of permanent magnets and loops of wire inside. When current is applied, the wire loops generate a magnetic field, which reacts against the outside field of the static magnets.

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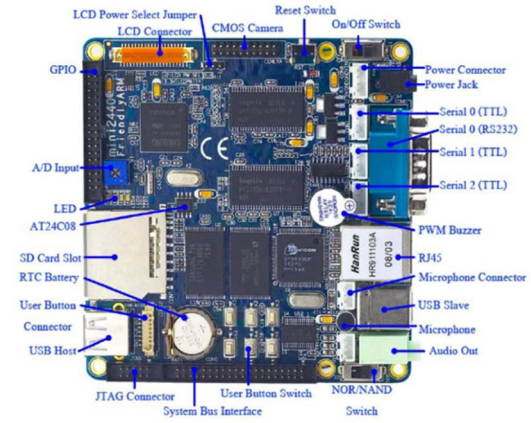
The interaction of the fields produces the movement of the shaft/armature. Thus, electromagnetic energy becomes motion.

V. HARDWARE IMPLEMENTATION

A. Mini2440 Development Board



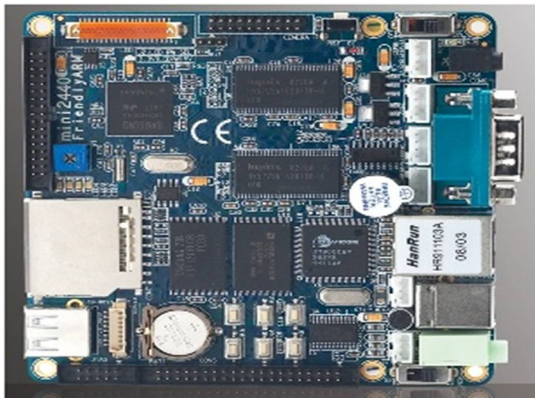


Fig2. Mini2440 Development board

The mini2440 Immersion Gold PCB using the 4-layer board design process, professional, such as long-wiring to ensure that the key signal lines of signal integrity, the production of SMT machine, mass production; the factory have been a strict quality control, with very detailed in this manual can help you quickly master the development of embedded Linux.Mini2440 is a practical low-cost ARM9 development board, is currently the highest in a cost-effective learning board. It is for the Samsung S3C2440 processor and the use of professional power stable core CPU chip to chip and reset security permit system stability.

VI. SOFTWARE IMPLEMENTATION

A. Linux Operating System

Linux or GNU/Linux is a free and open source software operating system for computers. The operating system is a collection of the basic instructions that tell the electronic parts of the computer what to do and how to work. Free and open source software (FOSS) means that everyone has the

freedom to use it, see how it works, and changes it. There is a lot of software for Linux, and since Linux is free software it means that none of the software will put any license restrictions on users. This is one of the reasons why many people like to use Linux .A Linux-based system is a modular Unix-like operating system. It derives much of its basic design from principles established in UNIX during the 1970s and 1980s. Such a system uses a monolithic kernel, the Linux kernel, which handles process control, networking, and peripheral and file system access. Device drivers are either integrated directly with the kernel or added as modules loaded while the system is running.

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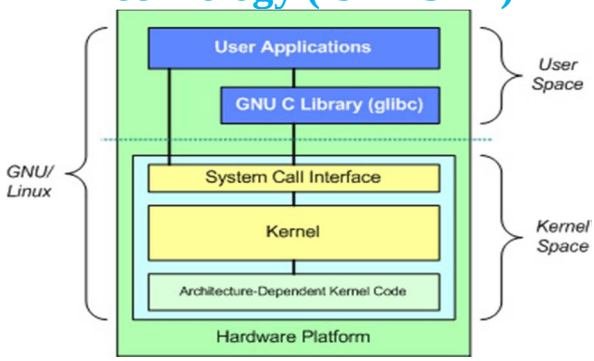


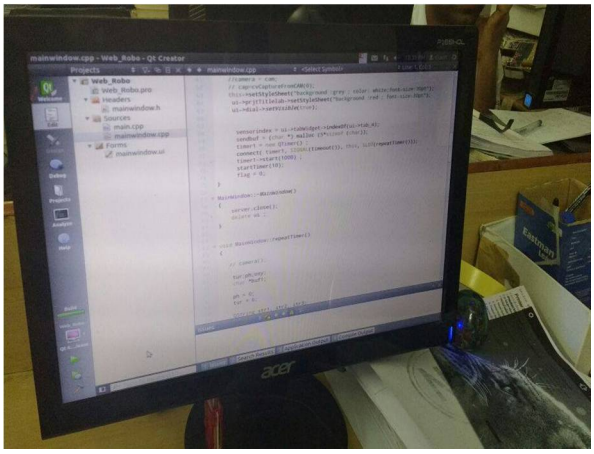
Fig.3: Architecture of Linux Operating System

B. Qt For Embedded linux

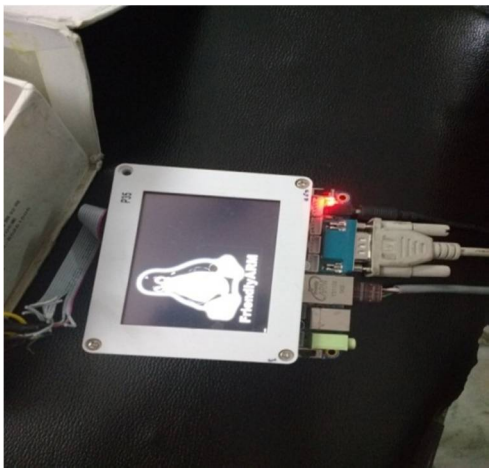
Qt is a cross-platform application framework that is widely used for developing application software with a graphical user interface (GUI) (in which cases Qt is classified as a widget toolkit), and also used for developing non-GUI programs such as command-line tools and consoles for servers. Qt uses standard C++ but makes extensive use of a special code generator (called the Meta Object Compiler, or moc) together with several macros to enrich the language. Qt can also be used in several other programming languages via language bindings. It runs on the major desktop platforms and some of the mobile platforms. Non-GUI features include SQL database access, XML parsing, thread management, network support, and a unified cross-platform application programing interface for file handling. It has extensive internationalization support

VII. RESULT

A. Simulated Result



B. Output Results



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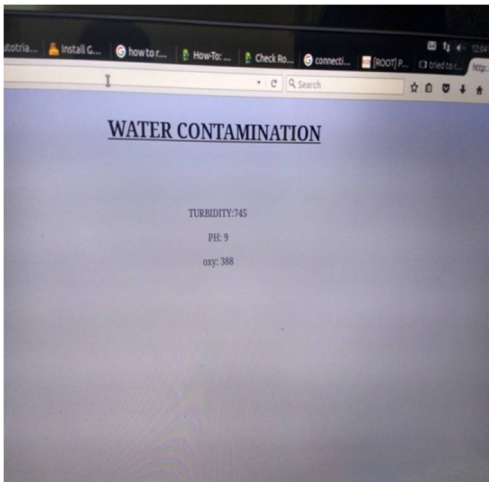

VIII. CONCLUSION

The project **"**A low cost sensor network for real time monitoring and contamination detection in drinking water distribution system**"** has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM9board and with the help of growing technology the project has been successfully implemented.

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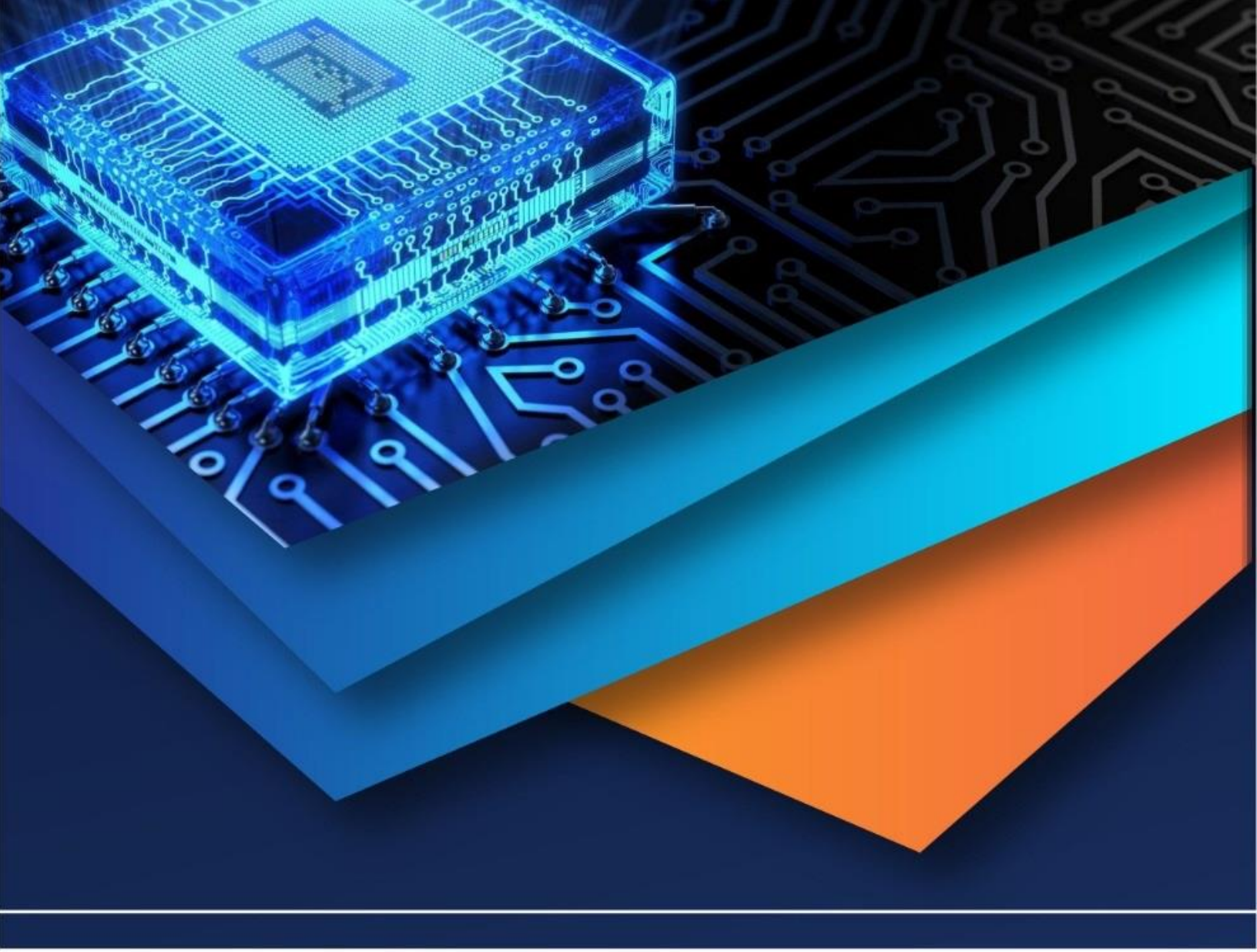
BIOGRAPHIES

P.SAIGEETHIKA is currently PG scholar of ES in Audisankara College Of Engineering and Technology,Gudur (Autonomous),SPSR Nellore (Dist), Affiliated to JNTU Anantapur. She received B.TECH degree in Electronics and Communication Engineering from JNTUA.

SHARAD KULKARNI (PHD) working as Professor at Audisankara College Of Engineering and Technology (Autonomous), Gudur, SPSR Nellore, AP.



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