Volume 8, No. 3, March – April 2017
ISSN No. 0976-5697
International Journal of Advanced Research in Computer Science
RESEARCH PAPER
Available Online at www.ijarcs.info

A Novel Approach to Maintain the Real Time Instantaneous Data from Patient Using Ultra Low Power Micro Controller

S. Aravid Pandi, S. Bharathi, R. Bharathiraja, L. Kiruthika and S. Boopathy*
K S R Institute for Engineering & Technology
Tiruchengode Tamil Nadu, India

***Abstract*:** Today's web based technology offers many online services in almost every field to communicate and share resources [2], [3]. The web technology overcomes the disadvantage of GSM in which the numbers of messages are limited. The advantage of web technology is that we can send N number of information over the medium .The idea of this paper is patient monitoring system using embedded, networking and cloud computing [4], [5]. It maintains a database of all the patients admitted in the hospital [6], [7], [10], [11]and monitor the Intravenous Infusion pumps drip level and the biological parameters such as heartbeat, body temperature and updating the status[1], [12], [13]. If critical condition is determined it send alert to the analyst of that hospital. The alert contains the data which are listed above. The system is intended to reduce the manual intervention to the most possible levels. The cloud computing helps to maintain the data base in every second [8].

Keywords: MSP 430, Intravenous infusion drip rate, heartbeat, temperature, cloud computing, web technology

I INTRODUCTION

Intravenous Infusion pumps are used to deliver infusion fluids to patients in hospitals. In India, The IV systems are not automated due to complexity and excessive cost for implementation of these systems. Drip rate in IV system has to be monitored and controlled regularly by physicians/nurses. Incorrect drip rate may even result in severe complications like heart arrest. We have developed an Automated Intravenous Drip meter which monitors the drip rate and level of infusion fluid in the solution bag/bottle. Patient's Electrocardiogram and temperature are given as input to the drip meter to control the drip rate. The drip rate along with patient's statistics is sent to a LCD display at Nurse Station using Wi-Fi. Therefore, this IV drip meter can intensively measure the patients drip infusion, eliminating the need for constant vigilance by nurses/physicians.

Cloud Computing [10] provides facilities for storage, management, processing, and accessing information and other data stored in several system[6], [7], platforms, applications etc. The above work represents the implementation of electronic hospital management system which enables date storage, update, retrieval, modification through cloud using the virtual private network which enhances the security of the data [5], [6], [7].

IILITERATURE OVERVIEW

There's the need of monitoring the Patient regularly andthe Database that contains only the Patient details,Delivery of drug is one of the major in the modern world of medicine [2], [3], [4]. In a year, it is estimated that nearly 1.5 million patients face complication due to errors in drug delivery. Avoiding such errors may benefit both the patients and physicians from further misery [2]. Most drug administration errors have been attributed to incorrect injection rates of medicine. A drug such as furosemide can be delivered to the patient too quickly, in which case it may cause serious harm. Conversely, a drug such as adenosine can be delivered too slowly and thus will not achieve the desired effect. Hence researchers continue looking for solutions to measure and monitor the drip injection rate[3]. The below figure depicts the demand for medical assistive technologies in different countries[8], [9].

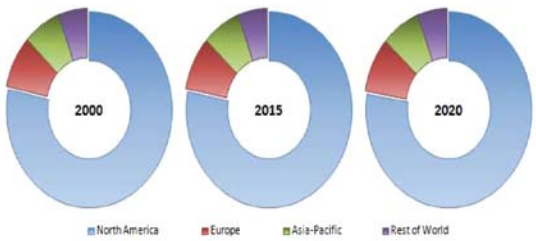

Fig .1. Market analysis

The United States is the largest market for Intravenous Solutions. Due to the cost advantage and rapid increase in population, Asia-Pacific is the fastest growing (14.49% during 2005-2015) market for Intravenous Solutions. Asia-Pacific and Rest of World are expected to gain market shares while the US may lose market dominance by the end of the analysis period (2005-2020). The automatic drug delivery systems are not adapted in India due to the need to reconstruct the entire setup of administration. Our Proposed system can be adapted to

existing IV infusion system and hence incur a less implementation cost.

III SYSTEM DESIGN OVERVIEW

A. Hardware Implementation

As we discussed above to observe Drip level, Body temperature and Heartbeat of a patient is the vital role. Intravenous fluid level will be measured by help of Fluid level sensor and the flow rate of infusion pump is controlled by stepper motor, for Human body temperature LM35 sensor is used and for Heartbeat rate ECG sensor is used and these all get interfaced with ARDUINO UNO board[1], [12], [13]. Drip level decides the Body temperature i.e. Body temperature is directly proportional to Drip level. If body level gets increased the dripping level of infusion pumps should reduce by Stepper Motor Initially, to activate the sensor Programming is written by Embedded C language and Bugged and compiled using ARDUINO software[1], [12], [13]. All the collected data's are transferred to database which eliminates the need of monitoring the data's continuously [4], [5], [6]. The observed data's get stored in database via Wi-Fi module second by second [8], [9], [10].

1. Liquid Level Sensor

The FDC2x1x is a multi-channel family of noise- and EMI-resistant, high-resolution, high-speed capacitance-to-digital converters for implementing capacitive sensing solutions. The devices employ an innovative narrow-band based architecture to offer high rejection of noise and interferers while providing high resolution at high speed. The devices support a wide excitation frequency range, offering flexibility in system design. A wide frequency range is especially useful for reliable sensing of conductive liquids such as detergent, soap, and ink.

2. Heart Rate Sensor

The **AFE4403EVM** is intended for evaluating the **AFE4403** device. The fully integrated AFE is ideally suited for Pulse Oximeter and Heart rate monitoring applications and consists of low noise receive channel, the LED transmit section and diagnostics for sensor and LED fault detection

3. Temperature Sensor

The LM89 is an 11-bit digital temperature sensor with a 2-wire System Management Bus (SMBus) serial interface. The LM89 [12], [13] accurately measures its own temperature as well as the temperature of an external device, such as processor thermal diode or diode-connected transistor such as the 2N3904. The temperature of any ASIC, GPU, FPGA or MCU can be accurately.

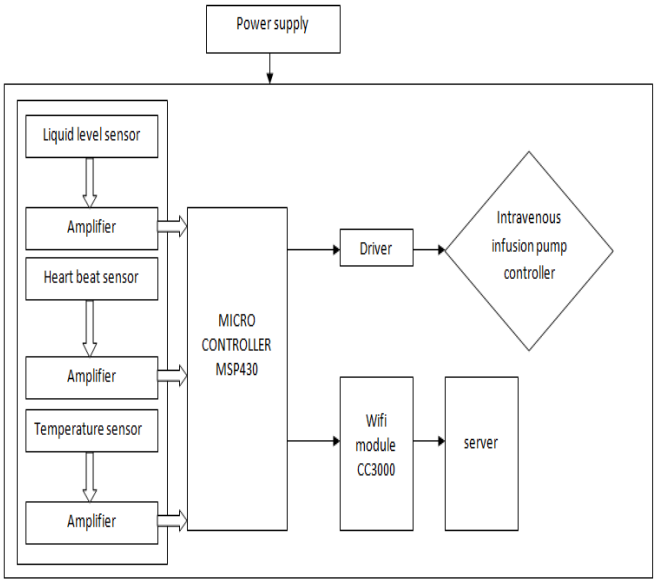

Fig.2: Block Diagram for hardware

4. Micro Controller

The MSP-EXP430G2 [12], [13] Launch Pad Development Kit is an easy-to-use microcontroller development board for the low-power and low-cost MSP430G2x MCUs. It has on-board emulation for programming and debugging and features a 14/20-pin DIP socket, on-board buttons and LEDs & Booster Pack Plug-in Module pin outs that support a wide range of modules for added functionality such as wireless, displays & more

5. Amplifiers

The LMC6062 is a precision dual low offset voltage, micro power operational amplifier, capable of precision single supply operation. Performance characteristics include ultra-low input bias current, high voltage gain, rail-to-rail output swing, and an input common mode voltage range that includes ground. These features, plus its low power consumption, make the LMC6062 ideally suited for battery powered applications [11].

6. WIFI Module CC3000

The TI CC3000 module is a self-contained wireless network processor that simplifies the implementation of Internet connectivity. TI's Simple Link Wi-Fi solution minimizes the software requirements of the host microcontroller (MCU) and is thus the ideal solution for embedded applications using any low-cost and low-power MCU.

The TI CC3000 module reduces development time, lowers manufacturing costs, saves board space, eases certification, and minimizes the RF expertise required. This complete platform solution includes software drivers, sample applications, API guide, user documentation, and a world-class support community.

7. Drivers

The driver ICS spans from 1-channel high side and 1-channel low side drivers all the way to 3-phase level-shift drivers and current senses ICS. The breadth and depth of the Infineon gate driver ic portfolio provides a solution for virtually every application and it to ease the driver selection process this overview is structured along the topologies of the gate drivers ICS, as opposed by topologies of the applications where in the driver ICS can be used.

B. Software Implementation

Our aim is to maintain all these data's in a webpage which is developed by using HTML (Hyper Text Markup Language). The stages of data transferring are 1.Frontend (WINDOWS PAGE) 2. Servlet 3.Backend (database). Request and Response is the way to retrieving the data's from the Database to Browser page via Servlet. The platform which is played here to maintain Database and Servlet is Oracle etc. [7],[8], [9]

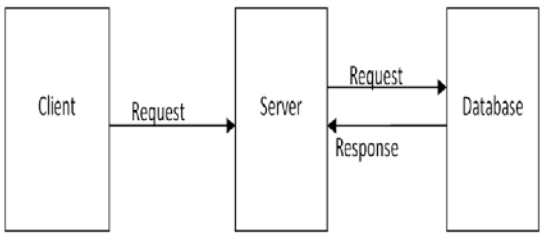

Fig. 3: Block Diagram for software

DOCTOR MODULE:

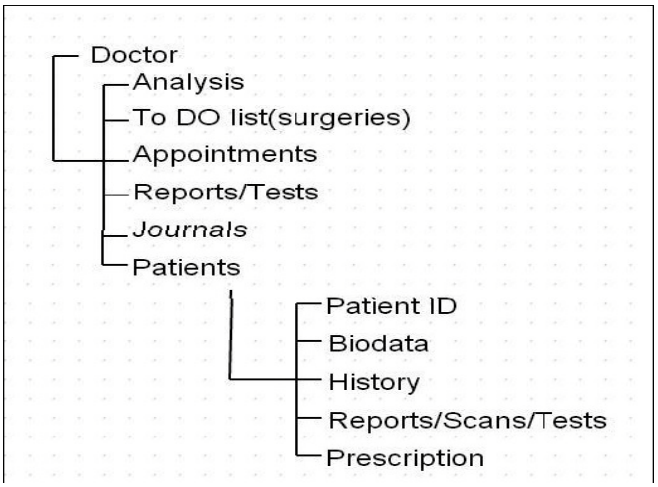

Fig. 4: Block Diagram for Doctor Module

PATIENT MODULE:

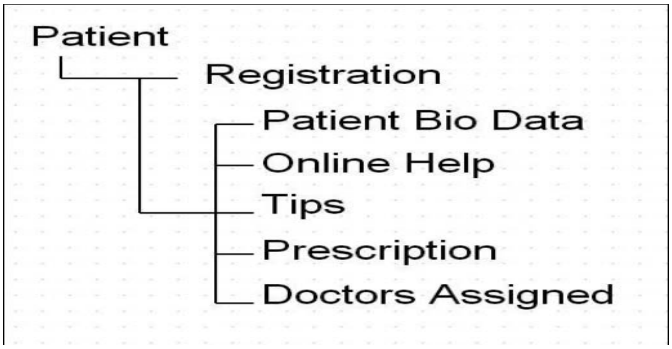

Fig. 5: Block Diagram for Patient Module

1. SERVER

The purpose of the server is to share the data as well as to share resources and distribute work. As server computer can serve its own computer programs as well depending on the scenario, this could be part of a quid pro quo transaction, or simply a technical possibility. A server [2], [3], [7], [8] and the calling process is a client. Thus any general purpose computer connected to a network can host servers. For example, if files on a device are shared by some process .that process is a file server. Similarly, web server software can run on any capable computer, and so a laptop or a personal computer can host a web server. When referring to hardware, the word server typically designates computer models specialized for their role better than a generic personal computer.

IV CONCLUSION

To reduce the number of Medical Analysts by Automation and to maintain the Patient Health details in their Database for further Treatment. The idea of this paper is patient monitoring system using embedded, networking and cloud computing.It maintains a database of all the patients admitted in the hospital and monitor the Intravenous Infusion pumps drip level and the biological parameters such as heartbeat, body temperature and updating the status. If critical condition is determined it send alert to the analyst of that hospital. .Since,they need Automation in their field for Patient Monitoring and Database maintaining."DOCTORS & MEDICAL ANALYSTS"are the users of our Projects the ease of their access is Visibling Updates about the Patient Health care readings in their Database

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Author's Profile

S.AravindPandi, pursuing UG degree in the discipline of ECE at K S R Institute for Engineering & Technology, Tiruchengode. He had presented many papers in the conferences and workshops. His areas of interest areimage processing, programming languages, embedded automation.

S.Bharathi, pursuing UG degree in the discipline of ECE at K S R Institute for Engineering & Technology, Tiruchengode. She had presented many papers in the conferences and workshops. Her area of interest is embedded automation, Circuit designing, debugging.

R.Bharathiraja, pursuing UG degree in the discipline of ECE at K S R Institute for Engineering & Technology, Tiruchengode. He had presented many papers in the conferences and workshops. His area of interest is embedded automation, content writing.

L.Kiruthika, pursuing UG degree in the discipline of ECE at K S R Institute for Engineering & Technology, Tiruchengode. She had presented many papers in the conferences and workshops. Her area of interest is embedded automation.

Boopathy.Sworking as an Assistant Professor in ECE department at K S R Institute for Engineering & Technology, Tiruchengode. He received his M.E in Embedded System Technologies from Regional Center, Anna University Coimbatore in 2014. He pursued his B.E in Electronics & Communication Engineering from Bannari Amman Institute of Technology, Sathyamangalam, and Tamilnadu, India in 2012 with distinction. He had published four papers in international journals. He also got two proceedings in international & national conferences. He is a life member of ISTE. He had two years of teaching experience.