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An ARM7 - Based Health Care Diagnosis System Using RFID Technology

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Abstract

Across the globe and especially in developing countries like India, diagnosing patients for specific disease at very early stage is not effective in real time practice. Especially in large infirmaries, there is no enough interaction across uneducated people and doctors. This scenario ends up in unawareness of their own medical records. This situation may further lead to situations wherein proper dosage of medicine prescribed by doctor will not be taken by illiterate people, which leads to death. Hence to provide an effective diagnosis through preserving medical records, we have proposed a health care system for the sake of saving lives of uneducated people. Using this system, in a crowded infirmary a doctor can easily pick the patients who needs immediate treatment. The system has patient's module at transmitting end and doctor's module at the receiving end. Patient's module will include RFID tag, RFID reader and sensors and doctor's module will include Liquid Crystal Displays (LCD), personal computer for enabling the doctors to monitor and call up the risky and emergency people to get into surveillance for initiating the treatment at the earliest. The sensors used in this system are pulse oxymetry sensor and flu sensor. Former is used to diagnose patient's heart rate and blood pressure while the latter is used to diagnose the flu using patient's blood samples. All these modules are controlled using an ARM7 microcontroller (lpc2129). We affirm that, our proposed system can provide best solution for all crowded infirmaries by prioritizing the patients to be served based on their medical records which is present at the patient module. Our system could also effectively preserve every patient's database in its module which is a very important factor for a doctor to proceed for further medication and advise the uneducated people to take up medicines regularly as per the preferred dosage.

Keywords: *RFID – Radio frequency Identification, ARM7 – Advanced Risc Machine7, pulse oxymetry sensor, flu sensor, infirmaries, LCD*

1 Introduction:

E-Health Care Diagnosis using RFID is a system used to diagnose patients in an infirmary and to treat them on priority basis.

System developed in [1] says that using RFID post-surgical patients can get cost-effective medical treatment, through eradicating hospitalization costs and preserving critical resources within hospitals and health-care facilities. Observing the patient health condition with respect to the prescribed drugs as suggested by physician on time bound basis increases the victory of treatment through speed recovery. Thus Smart health monitoring and tracking systems are needed to improve the recovery rates of the patients.

System developed in [3] has a RFID tags and web services which provides access to patient's personal data and medical records only to authorized users. Interoperability is maintained by through web servicing interfaces. Medical information can be viewed through website. There is ease in updation and adaptation of the system as it is built using web services. Using multi-layer health care systems, hospitals are able to track medical records of patients through RFID technology and also provides safety in

securing the patient's records and avoid medical errors through marking each patient with RFID tag which is unique for every patient.

Here, the proposed system diagnose the patients with the help of their previous medical records stored in their RFID tag. The results are checked by a doctor through a monitoring database and the patient who is under major risk will be prioritized and taken up for immediate consultation with the physician at the earliest by simply monitoring their blood pressure and heart rate through this tracking system. Thus the proposed system will aid lots of patient as well as ease doctors' work. Adopting this system in infirmaries will help many who suffer from flu and other diseases.

2 System Design

This division eloborates the conceptual design of an E-Health Care Diagnosis Using RFID (Fig.1). Here, the patient's module includes RFID tag, RFID reader, heart rate sensor, blood pressure sensor and pulse oximetry sensor. Similarly doctor's module includes LCD, UART & PC. Here the sensors are used to diagnose the patient's present condition towards their blood pressure, heart rate and oxygen levels through which occurrence of FLU is confirmed. These data's are transmitted through ARM7 microcontroller. RFID technology is used in patient module to read the present condition of the patient and the same is sent to PC present in the doctor module via UART. An LCD is available to simply see the data without any analysis , for giving out priority to the patients who are under critical state.

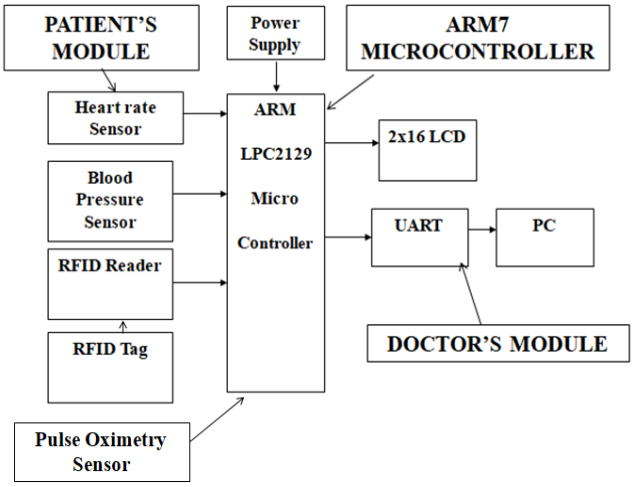

Fig.1. Block diagram of the proposed healthcare diagnosis System

3 Hardware System Design

A. RFID Reader & Tag

We are using a passive RFID tag which stores the patient's information, the tag gets active only when it comes in contact with the reader, a reader has antenna which emits radio waves.

B. ARM7 (LC2129)

LPC 2129 comes under ARM7 (Advance Risc Machine) family (fig.2). It operates at an clocking speed of about 60MHz and can be readily interfaced with external peripherals. It needs low power for its functioning which best suits our project.

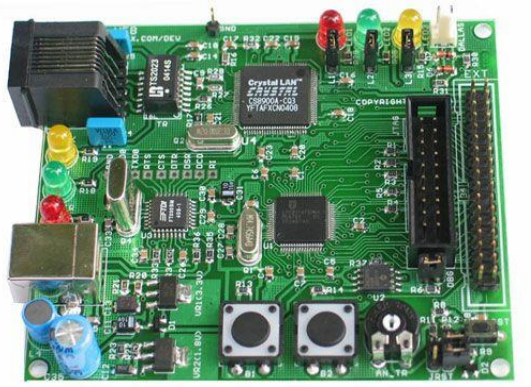

Fig.2.ARM7 (lpc 2129)

C. Sensors

Fig 3 illustrates how an pulse oxymetry sensor should be interfaced with patients to record their oxygen level and heart rate. Fig 4 depicts the overall view of patient module which includes all sensors as mentioned in fig 1 for tracking and diagnosing the patients as per their medical records.

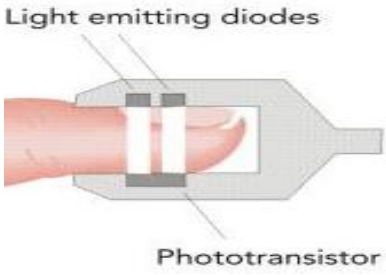

Fig.3.pulse oxymetry sensor

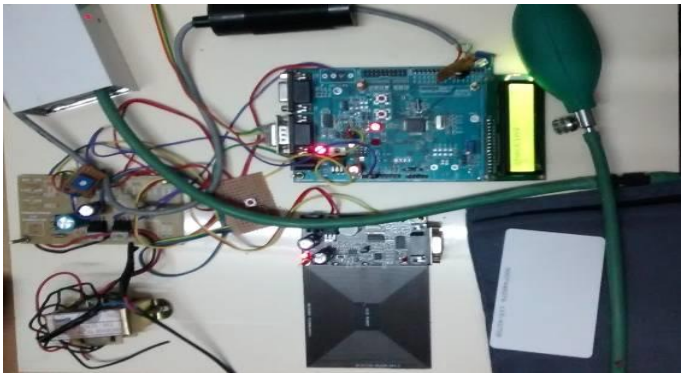

Fig.4. Overview of patient module

4 Software System Design

D. Keil Compiler

This software is mainly used to actuate ARM7 (lpc 2129) microcontroller based on the input received by it. The preferable coding language used here is "Embedded C". Here, at the patient's module, sensors are actuated and the status of the same were transmitted using RFID via LPC2129 based on the code which were written using this compiler. Liquid crystal display shows the output with immediate effect upon reception at the doctor's module.

E. Proteus Simulator

We use proteus simulator for simulating our hardware and to check whether the system will be feasible for proposed system or not as shown in fig 5.

F. Visual Basic with .Net

Here, Visual Basic and .Net is used for the creation of monitoring database at doctor's cabin. This database includes basic parameters about the patients to be known at this receiving end. Parameters include patient details (RFID no., Name, Phone number, Records, Diagnosed Results, etc,). Based on the details, a doctor can easily prioritize patients.

5 Results & Discussion

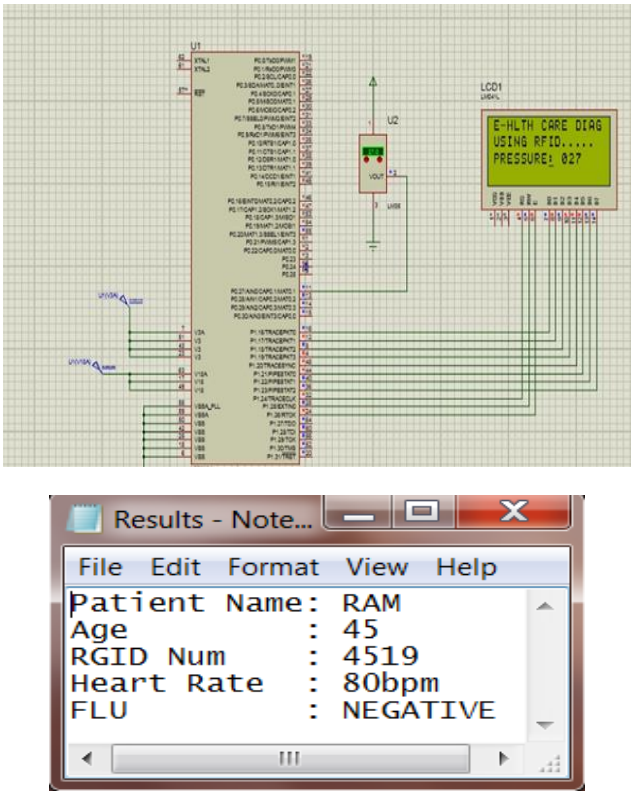

Fig.5. Simulation Output

Fig 5 depicts the interfacing of ARM LPC2129 with LCD module and pressure sensor using proteus simulator. Upon simulation, LCD module displays the pressure values received by processor on real time basis. Also this figure shows the simulated result of the indication towards the presence of FLU in the patient under test.

The outcome of Fig.4 is interfacing the patient module with LPC2129 and the same is presented in Fig6. Here, the Blood Pressure Cuff & Heart Beat Sensor were fixed with the patient and data from these sensors were transmitted onto LCD present in the doctor's module on real time basis

Fig.6. Sensor Output broadcasting heart rate & BP in the LCD Module

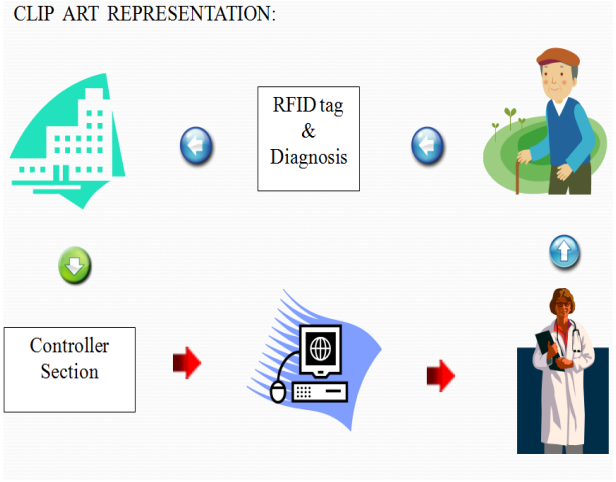

Fig.7. Graphical Representation

6 Conclusion

Thus, our proposed E-Health Care Diagnosis Using RFID is able to maintain the medical record electronically which further ensures the growth of remote health care under rural communities. By implementing these kind of tracking systems, it is predicted that the system will offer good self-assistance and henceforth improves the health care of illiterate people in remote areas who are unaware of their medical records. Thus it provides an efficient solution in infirmaries for diagnosing patients on priority basis. In future, this system can be interfaced with multiple sensors and the choice of sensors can be taken based on the crises which prevails all over the world for the sake of rescuing people from the infected disease at the earliest for saving their lives.

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