Biomedical Application of Embedded System for Malnutrition

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Abstract — Embedded system applications made an rising importance in biomedical engineering, such as patient monitoring and clinical analysis. The lack of generic architecture makes the design of this type of autonomous embedded system a cumbersome and expensive task. Unifying the Biomedical engineering this paper proposes one kind of embedded system named Biomedical Application of Embedded System for Malnutrition using ARM 7 microcontroller. This system can achieve the purpose of long distance real time monitoring of malnutrition.

Keywords — Embedded System, Biomedical Application, and Malnutrition.

I. INTRODUCTION

Now a day there has been tremendous interest on embedded system for biomedical application. Embedded system is a combination of processors, sensors, actuators, “intelligence”, “hidden computer” and massive development. Intensive with uncertain environment, this system operates in constrained environments in which computer memory and processing power are limited. They often provide their service within strict time deadline to their user and to the surrounding world. RTOS are used in embedded software. It is designed in such a manner that it runs on it’s without human intervention respond to events in real time. One of the fundamental requirements for embedded system is the ability to obtain the testing data from command line of the program for process control in the testing system. This paper proposes the communication architecture for implementing distributed platform that support autonomous embedded system for medical application.

Biomedical technology broadly refers to the application of engineering and technology principles to the domain of living or biological systems. Usually inclusion of the term biomedical denotes a principal emphasis on problems related to human health and diseases, whereas terms like "biotechnology" can be medical, environmental, or agricultural in application.

In the society, there permanently increases number of people whose occurs the state of health requires relatively frequent medical check or examinations. People, who passed or suffer from specific diseases, the subsequences of which can occur unexpectedly and result in critical health situation, represent the other group. The solution could be the continuous remote monitoring of certain patients' severe functions important for their life with possible providing the help. Under the remote monitoring the sensing of important data about a person's health anywhere they just are and transmission of these data into the technological centre where they will evaluated are understood. The applicability of this idea has a great potential.

Malnutrition is a disparity between the amount of food and other nutrients that the body needs and the amount that it is receiving. This imbalance is most frequently associated with under nutrition, the primary focus of this article, but it may also be due to over nutrition. General malnutrition often develops slowly, over months or years. As the body’s store of nutrients is depleted, changes begin to happen at the cellular level, affecting biochemical processes and decreasing the body’s ability to fight infections. Over time, a variety of symptoms may begin to emerge, including: Anemia, Edema, and Goiter.

People suffering from malnutrition are commonly observed in remote areas. To give proper diagnosis in these remote areas is very necessary. By using this type of system we can not only monitored diseases but also maintain the records related to these diseases. This type records will helpful in future for the particular disease analysis.

II. ARCHITECTURE OF THE SYSTEM

![Block diagram of Biomedical Application of Embedded System for Malnutrition](image-url)

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III. BLOCK DIAGRAM DESCRIPTION

A. ARM 7 MICROCONTROLLER

ARM-7 microcontroller acquires and stores different parameter of from different tests. The main block of Biomedical Application of Embedded System for Malnutrition is ARM-7 micro controller which is heart of the system which provides monitoring actions. It senses signals from input blocks and processes output blocks. The software program is stored in ARM-7 microcontroller on chip memory, according to which it provides the controlling actions. The on chip ADC converts these parameters into digital form and gives to the ARM-7 microcontroller. The LCD block is provided for visual display of the message. Also it continuously displays the measured parameters. Also all the standard parameters related tests performed will compare with the parameters obtained after the test. By comparing these two data, it will be decided that whether the person is suffering from malnutrition or not. Then after adding results from other test performed, report will generate. This report will send to the authorized person through GSM modem.

B. LCD Display

On the LCD Display, instantly data report of arm 7 microcontrollers will be displayed. It will show that the result of test performed whether suffering from malnutrition or not. This LCD display is interfaced with microcontroller which is output device.

C. Result of Malnutrition test

The various parameters from LIPID, CBC(Complete blood count), CMP(Comprehensive Metabolic Panel), albumin and Total Protein Test will be taken and send it to the microcontroller for processing.

D. GSM Modem

GSM (Global System for Mobile Communications: originally from Group Special Mobile) is the most popular standard for mobile telephony systems in the world. The GSM association has its promoting industry trade organization of mobile phone carriers and manufactures, estimate that 80% of the global mobile market uses this standard. A GSM modem is wireless modem that works with a GSM wireless network. GSM modem requires a SIM card from a wireless carrier in order to operate. A GSM available service like SMS (Short Message Service) represents alternative modalities to make remote measurements and control. SMS service is suited for remote control applications that requires small amount of data and rare activation, like sending alarms, or emergency commands. The system can be interconnected with the car alarm system and alert the owner, on his mobile phone. The system is composed by a microcontroller and a GSM phone.

IV. ALGORITHM

1. Start
2. Collect the parameter from various tests.
3. Send the collected information to the Analog to Digital Converter.
4. Then microcontroller processes the data.
5. Microcontroller will compare the result with already stored standard result.
6. Also add the result from other test for better report.
7. Display the result on the LCD Display.
8. Send the report over GSM.
9. Stop.

V. FLOW CHART

VI. ADVANTAGES

- Monitoring of health of those people which are living in remote areas.
- Recording of data related to the health of people.
- Analyzing the health issues.
- Instantly recognize that, whether person is suffering from malnutrition or not.
- Processed report will help for diagnosing.
- Processed Report can be send to health officer or any authorized person.

VII. DISADVANTAGES

- Collection of standard data for comparison with newly performed test report is difficult.
- Confirmation of sending report to the authorized user is not obtained.
VIII. APPLICATIONS

- Remote hospitals.
- Proper treatment will be provided after diagnosing in remote area.
- By changing tests, number of diseases can be monitored.
- In industries, health of employees can be monitored.
- In military, health of soldiers and officers can be monitored.

IX. FUTURE SCOPE

- Health report for multiple can be obtained.
- Health report of multiple persons can be processed and can be sending to multiple persons.
- Multiple diseases can be monitored.

X. CONCLUSION

This paper will help in exploring and exploiting new opportunities in the emerging interface between computer and healthcare. An effective solution is provided to develop the intelligent system which will monitor various parameters of human being and will send this data to the authorized user is explained in this paper. By using hardware platform who’s Core is ARM7, GSM module. The problems like malnutrition in our society can be well monitored which will help in proper diagnosing.

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