An Efficient Patient Monitoring System using PLC with Microcontroller

K. Pavithra, A. Syed Musthaba
d
PG Scholor, Assistant Professor
Gnanamani College of Technology, Namakkal

ABSTRACT:
Power line communication based efficient non-invasive wearable vital parameter monitoring device. The PLC based system can be used to monitor physiological Parameters, such as temperature and heart rate of a human subject. The device detects if a person is medically distressed and sends an alarm to a receiver unit that is connected to a computer. It is more efficient because of AVR controller. Because the AVR family has a lot of good with nice peripherals, low power consumption, and good cross-platform support and reduced instructions set. The PLC based patient monitoring system improving data rate (several kilometers) extended using repeaters. The proposed system has low cost because of reduced system size and reduced PC also. Therefore analyzing a system that can constantly measure the important parameters of patient’s body and which can alert the doctor on any time when the patient’s condition gets bad, this can be really provide quick service and be beneficial in saving a lot of lives.

Index – PLC, AVR, Microcontroller.

I. INTRODUCTION

Focusing on composite laminates, consisting of a stacking sequence of laminae or plies joined together through resin enriched regions, structural health monitoring plays a prominent role. In fact, composite structures are now adopted in various fields ranging from aeronautics to civil engineering; in all the cases, the high stiffness to weight and strength to weight ratios featured by composite materials, specifically designed in order to attain them, are appropriately exploited to guarantee higher performances. This can also increase the sensitivity of the structural components to defects, in case their toughness is not high enough to guarantee an overall ductile response, providing a possible nucleation of catastrophic failure events. The developed system can also analyze the stress level corresponding to thermal humidity index. The IEEE802.15.4 and IEEE1451.2 standards-based sensor module has been developed successfully.

The zigbee device and PIC18F4550 microcontroller are used in the implementation of sensor module. Technology is already part of modern farming and is playing an increasing role as more advanced systems and tools become available. Mostly veterinary staff checks the physiological parameters through manually. Currently livestock farmer’s faces lot of problem on monitoring the health of livestock and thus modifications are being persistently recommended in instrumentation [1]. To prevent any distortion of the composite microstructure, which may trigger by itself the nucleation of the aforementioned defects, sensors should not be embedded inside the composite; in addition, to avoid a mechanical interaction
between the monitoring system and the structure, sensors should be as lighter as possible. This can also increase the sensitivity of the structural components to defects, in case their toughness is not high enough to guarantee an overall ductile response, providing a possible nucleation of catastrophic failure events. The effectiveness and robustness of a MEMS-based, surface-mounted health monitoring scheme for laminates [2].

The traffic-shaping algorithm converts the user health data traffic to the non-health data traffic such that the capability of traffic analysis attacks is largely reduced. Geo-distributed cloud service is a trend in cloud computing which, by spanning multiple data centres at different geographical locations, can provide a much more economical solution to offer efficient services to groups of users in their proximity in terms of reduced bandwidth costs and increased availability [3].

The resource allocations to provide a sustainable and high-quality service in health monitoring systems formulate and solve two resource optimization problems, respectively. In the first optimization problem, steady-rate optimization problem, we optimize the source rate at each sensor to minimize the rate fluctuation with respect to the average sustainable rate, subject to the requirement of uninterrupted service. The first optimization problem is solved by a proposed analytical solution. The body sensors are powered by battery. Battery replacement is impossible for the sensors implanted inside the human body. The low recharging rates and the dynamics of energy harvesting process, it is a challenging task to provide services without interruption caused by exhausted battery. [4].

The proposed methodology is based on a fuzzy regular language for the generation of the prognoses of the health conditions of the patient, whereby the current state of the corresponding fuzzy finite-state machine signifies the current estimated health state and context of the patient. The estimating the user’s health status and which can provide alerts and information regarding the current status and context of the user, as well as regarding alarming health trends.

The proposed framework, as in any other DSS, is not meant to replace the doctor in any way and derive diagnosis for the patient, but rather to provide estimations regarding the user’s condition and as such to “to enhance and support the human, who is ultimately responsible for the clinical diagnosis”. Efficient methodologies for embedded ECG analysis will also be investigated. [5].

A variety of system implementations are compared in an approach to identify the technological shortcomings of the current state-of-the-art in wearable biosensor solutions. An emphasis is given to multi-parameter physiological sensing system designs, providing reliable vital signs measurements and incorporating real-time decision support for early detection of symptoms or context awareness.

The previous illustrates the fact that a wearable medical system may encompass a wide variety of components: sensors, wearable materials, smart textiles, actuators, power supplies, wireless communication modules and links, control and processing units, interface for the user, software, and advanced algorithms for data extracting and decision making. The current study highlights the fact that there are still a lot of
challenges and issues that need to be resolved for wearable systems to become more applicable to real-life situations and also to become accepted by patients and other users as a reliable, multifunctional, easy-to-use, and minimally obtrusive technology that can increase their quality of living [6].

The generation of the prognoses of the health conditions of the patient, whereby the current state of the corresponding fuzzy finite-state machine signifies the current estimated health state and context of the patient. The operation of the proposed scheme is explained via detailed examples in hypothetical scenarios. They should be able to learn individual user baselines and also employ advanced information processing algorithms and diagnostics in order to discover problems autonomously and detect alarming health trends, and consequently, inform medical professionals for further assistance [7].

The system is a distributed array of permanently attached piezoelectric guided wave transducers where pairs of transducers are used in pitch–catch configuration allowing the detection and localization of damage in the plate. A way to simplify the detection of damage is to compare a signal captured during the operational life of the structure with a signal captured when the structure is known to be undamaged. The simplest way to do this is to subtract the two signals. The bane of such techniques is the lack of long-term stability mainly due to changes in environmental conditions. To overcome this, a method termed OBS that uses a number of baselines captured over a range of conditions has been previously proposed [8].

It uses the control commands and sensor measurements to generate the residuals, which have a unique static pattern in response to each fault. Then, the residual processor interrogates the residuals by matching them to one of several known patterns. It computes the probability of each hypothesis conditioned on the history of residuals. The fault detection latency is reduced by integrating the design of the residual generator and the residual processor. The conditional probabilities are computed using residuals generated by the fault detection filters and the parity equations. These residuals have a unique static pattern with respect to a given fault or No-fault condition. Nominally, the residuals are non-zero only when a fault has occurred and are zero at other times. The fault detection filters are shown to have good performance in arbitrary vehicle motion even though they are designed using a linear vehicle model associated only with the longitudinal or lateral vehicle dynamics [9].

II. Existing Method

The system has been to take several inputs to measure physiological parameters of human such as temperature, heart rate, and detection of any fall. The inputs from the results are sent through the Zigbee Module to a host computer, which stores the data into an Access Database. The values can be displayed on the Graphical User Interface (GUI) running on a computer. The program is a user interface, allowing a report on the current status of the individual. The system consists of an electronic device which is worn on wrist and finger by an at-risk person.

Using several sensors to measure different vital signs the person is wirelessly
monitored. An impact sensor has been used to detect falls. The device detects if a person is medically distressed and sends an alarm to a receiver unit that is connected to a computer.

The ZigBee network layer natively supports both star and tree networks, and generic Mesh networking. Every network must have one coordinator device, tasked with its creation, the control of its parameters and basic maintenance. Within star networks, the coordinator must be the central node. Both trees and meshes allow the use of ZigBee routers to extend communication at the network level.

The Zigbee to transmit the data between the rate of 250kb/s. The module only helps to transmit the data between their sources to destination.

**III. Proposed Method**

The AVR is a modified Harvard architecture 8 bit RISC single chip microcontroller, where program and data are stored in separate physical memory systems that appear in different address spaces, but having the ability to read data items from program memory using special instructions. Some devices have a parallel external bus option to allow adding additional data memory or memory-mapped devices.

**PLC Module**

Power line communication or power line carrier (PLC), also known as power line digital subscriber line (PDSL), mains communication, power line telecom (PLT), power line networking(PLN), or broadband over power lines (BPL) are systems for carrying data on a conductor also used for electric power transmission.
Heart Rate Sensor

More advanced models will offer measurements of heart rate variability, activity, and breathing rate to assess parameters relating to a subject's fitness.

The amount of light that was detected by the phototransistor varied with the patient’s heart pulse, as the amount of absorbed IR light changed with the flow of blood, which is directly linked to the heart rate. This signal was then amplified, filtered, and sent to the microcontroller to be analyzed. To get the best and most accurate results with the heart rate sensor we chose to measure the pulse at the finger tip like commercial device do.

IV. EXPERIMENTAL RESULTS

Result and Discussions

The system will improve the structure of traditional patient monitoring systems. The intelligent patient monitoring systems will posses more flexible architecture. Thus, the fast data monitoring can be achieved through the proposed system. The power-line as a communication medium could also be a cost-effective way compared to other systems because it uses an existing infrastructure, wires exists to every household connected to the power-line network. While the idea of sending communication signals on the same pair of wires as are used for power distribution is as old as the telegraph itself, the number of communication devices installed on dedicated wiring far exceeds the number installed on AC mains wiring.

V. Conclusion

These system monitors patient's health status. In case, the value for any of these parameters exceeds preset critical values, it is intimated to doctor using alarm. All the information obtained from the human body by sensors is transmitted to the processor system as digital values. These sensors monitors and transfer data to receiver module using Power Line Communication network. The receiver unit would ideally be enhanced so that it can connect to either the local or cellular phone network, and in the case of an emergency would contact an ambulance. The Temperature sensor has interfaced to identify the patient body temperature continuously. In the conclusion we consider how this system can be further improved in future, may be by adding new type of sensors as well as using new approaches for the security and triggering alarm.

REFERENCES


