Microcontroller-based Wireless Heart Rate Telemonitor for Home Care

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Abstract: - Homecare is the provision of health care services to patients in their own home. One of the main purposes of homecare telemedicine is to develop a wireless, low-cost and use-friendly system which allows patients to measure their own vital signs, such as heart rate and temperature, and provide the health care professionals with the facility to remotely monitor the patient's vital signs quickly and easily. The gadget would then activate a GSM modem (SIM based) and also a GPS (global positioning system). The gadget would then take out the location reading from the GPS. Other vital information such as Heart Rate and temperature is taken and sent to predefined numbers. The receiver will get an SMS which will contain information of the senior person with his/her position co-ordinates and his/her current status (Heart Rate). An onscreen display will start scrolling the person's name, address and contact details so that people who try to help such a person get the complete information from the device.

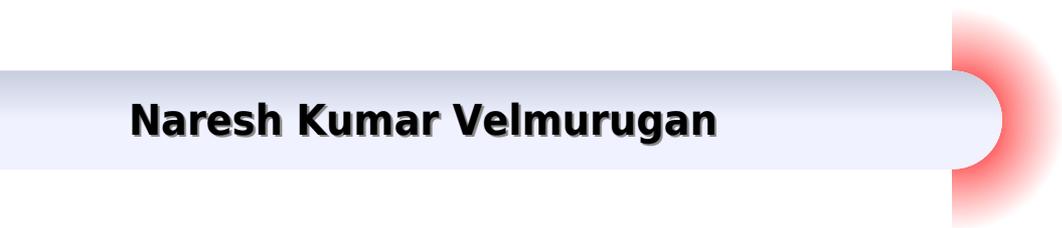**Keywords** - PIC Microcontroller, LM35, GPS, GSM, Heart Rate sensor.

1. INTRODUCTION

Today, the medical field is faced with growing public concerns and government demands for reform. The outrage is directed at the high costs of quality health care and the inability of healthcare specialists to provide adequate medical services to rural populations. The availability of prompt and expert medical care can meaningfully improve health-care services at understaffed rural and remote areas [1-3]. In distant regions of the country the degree of development of healthcare providing services has not reached the appropriate level to adequately address the health care needs of the populations in these areas. A mobile monitoring system utilizing Short Message Service with low-cost hardware equipment has been developed and implemented to enable transmission of the temperature and Heart Rate signal of a patient [10]. At the consultation unit, dedicated application software is required to manage the follow of SMS messages from the Mobile and display the temperature and Heart Rate of the patient. The special of this device is it is not only measure Heart Rate and temperature measurement, but also will display the measured Heart Rate in beat per minute. The device consists of electronic circuit system, embedded system which is microcontroller program. The Heart Rate monitoring systems consists infrared LED, photo transistor as a sensing device for the Heart Rate system. Conventional telemedicine systems using Public Switched Telephone Network (PSTN) land lines are already available to enable a doctor to monitor a patient remotely for home care or emergency applications [5], [6]. Also, the mobile phone has been recognized as a possible tool for telemedicine since it became commercially available. This system which allows patients to measure their own vital signs, such as Heart Rate, temperature and provide the health care professionals with the facility to remotely monitor the patient's vital signs quickly and easily, vital signs can be transmitted from an ambulance to a hospital in a store-and-forward mode [7], [8], or in real-time mode [9].

A PIC16C774A microcontroller was then interfaced to the wearable Heart Rate signal to collect the data from these devices, process them, store them and feed them to a transmitter. A high performance RF Module Tri-Band GSM/GPRS 900/ 1800/ 1900 MHz transmitter and receiver were then used to Wirelessly transmit and receive the vital sign data from the micro-controller to the consultation unit, dedicated application is required to manage the follow of SMS messages from the Mobile and display the temperature, location and Heart Rate of the patient".

Microcontroller Based Wireless Heart Rate Telemonitor For

Naresh Kumar Velmurugan

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Advanced Computational and Communication Paradigms Siddhartha Bhattacharyya,Tapan Gandhi,Kalpana Sharma,Paramartha Dutta,2018-06-07 The book titled Advanced Computational and Communication Paradigms Proceedings of International Conference on ICACCP 2017 Volume 1 presents refereed high quality papers of the First International Conference on Advanced Computational and Communication Paradigms ICACCP 2017 organized by the Department of Computer Science and Engineering Sikkim Manipal Institute of Technology held from 8 10 September 2017 ICACCP 2017 covers an advanced computational paradigms and communications technique which provides failsafe and robust solutions to the emerging problems faced by mankind Technologists scientists industry professionals and research scholars from regional national and international levels are invited to present their original unpublished work in this conference There were about 550 technical paper submitted Finally after peer review 142 high quality papers have been accepted and registered for oral presentation which held across 09 general sessions and 05 special sessions along with 04 keynote address and 06 invited talks This volume comprises 65 accepted papers of ICACCP 2017 <u>Computational Science and Engineering</u> Arpan Deyasi,Soumen Mukherjee,Pampa Debnath,Arup Kumar Bhattacharjee,2016-12-19 Computational Science and Engineering contains peer reviewed research presented at the International Conference on Computational Science and Engineering RCC Institute of Information Technology Kolkata India 4 6 October 2016 The contributions cover a wide range of topics electronic devices photonics electromagnetics soft computing artificial intelligence modern communication systems Focussing on strong theoretical and methodological approaches and applications Computational Science and Engineering will be of interest to academia and professionals involved or interested in the above mentioned domains **Proceedings of the 25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society** IEEE Engineering in Medicine and Biology Society. Conference,2003 **Proceedings of the Multi-Conference 2011** Himanshu B. Soni,Apurva Shah,2011-06-06 The International Conference on Signals Systems and Automation ICSSA 2011 aims to spread awareness in the research and academic community regarding cutting edge technological advancements revolutionizing the world The main emphasis of this conference is on dissemination of information experience and research results on the current topics of interest through in depth discussions and participation of researchers from all over the world The objective is to provide a platform to scientists research scholars and industrialists for interacting and exchanging ideas in a number of research areas This will facilitate communication among researchers in different fields of Electronics and Communication Engineering The International Conference on Intelligent System and Data Processing ICISD 2011 is organized to address various issues that will foster the creation of intelligent solutions in the future The primary goal of the conference is to bring together worldwide leading researchers developers practitioners and educators interested in advancing the state of the art in computational intelligence and data processing for exchanging knowledge that encompasses a broad range of disciplines among various

distinct communities Another goal is to promote scientific information interchange between researchers developers engineers students and practitioners working in India and abroad **EMBC 2004** IEEE Engineering in Medicine and Biology Society. Conference,2004 Intelligent Pervasive Computing Systems for Smarter Healthcare Arun Kumar Sangaiah,S.P. Shantharajah,Padma Theagarajan,2019-06-21 A guide to intelligent decision and pervasive computing paradigms for healthcare analytics systems with a focus on the use of bio sensors Intelligent Pervasive Computing Systems for Smarter Healthcare describes the innovations in healthcare made possible by computing through bio sensors The pervasive computing paradigm offers tremendous advantages in diversified areas of healthcare research and technology The authors noted experts in the field provide the state of the art intelligence paradigm that enables optimization of medical assessment for a healthy authentic safer and more productive environment Today s computers are integrated through bio sensors and generate a huge amount of information that can enhance our ability to process enormous bio informatics data that can be transformed into meaningful medical knowledge and help with diagnosis monitoring and tracking health issues clinical decision making early detection of infectious disease prevention and rapid analysis of health hazards The text examines a wealth of topics such as the design and development of pervasive healthcare technologies data modeling and information management wearable biosensors and their systems and more This important resource Explores the recent trends and developments in computing through bio sensors and its technological applications Contains a review of biosensors and sensor systems and networks for mobile health monitoring Offers an opportunity for readers to examine the concepts and future outlook of intelligence on healthcare systems incorporating biosensor applications Includes information on privacy and security issues on wireless body area network for remote healthcare monitoring Written for scientists and application developers and professionals in related fields Intelligent Pervasive Computing Systems for Smarter Healthcare is a guide to the most recent developments in intelligent computer systems that are applicable to the healthcare industry 4th European Conference of the International Federation for Medical and Biological Engineering 23 - 27 November 2008, Antwerp, Belgium Jos van der Sloten,Pascal Verdonck,Marc Nyssen,Jens Haueisen,2009-02-04 The 4th European Congress of the International Federation for Medical and Biological Federation was held in Antwerp November 2008 The scientific discussion on the conference and in this conference proceedings include the following issues Signal Image Processing ICT Clinical Engineering and Applications Biomechanics and Fluid Biomechanics Biomaterials and Tissue Repair Innovations and Nanotechnology Modeling and Simulation Education and Professional User-Driven Healthcare: Concepts, Methodologies, Tools, and Applications Management Association, Information Resources,2013-01-31 User Driven Healthcare Concepts Methodologies Tools and Applications provides a global discussion on the practice of user driven learning in healthcare and connected disciplines and its influence on learning through clinical problem solving This book brings together different perspectives for researchers and practitioners to develop a comprehensive framework of user driven healthcare Index to

IEEE Publications Institute of Electrical and Electronics Engineers,1998 Issues for 1973 cover the entire IEEE technical literature **Development of an Optical Heart Rate Monitor Using a Microchip PIC24-microcontroller Based Development Board** Aparna Rakurthi,2012 The primary goal of this thesis is to develop a prototype device that can be used to demonstrate some key and fundamental concepts related to the disciplines of computer and electrical engineering to freshman engineering students This objective is achieved through the development of a heart rate monitor that primarily consists of a sensor module for heart beat detection and a Microchip PIC microcontroller based development board for heart rate calculation The central element of the sensor module is an optical detection system that consists of a light emitting diode and photodiode setup to detect heart beat from a measurement site with strong pulse like a fingertip The obtained heart beat signal is then passed through multiple amplification and filtering stages to obtain a clean and strong heart beat signal Using this optical sensor module implemented on a printed circuit board PCB we can demonstrate several concepts related to electrical engineering such as basic electronics semiconductor devices analog circuit design optical electronics PCB design etc The voltage signal obtained from the sensor module is sent to a Microchip Explorer 16 development board for further signal processing and heart rate calculation The development board contains a 16 bit PIC microcontroller with a built in 10 bit analog to digital converter that is used to digitize the analog voltage signal and calculate heart rate as beats per minute using a heart rate calculation algorithm The calculated heart rate is finally displayed on an alphanumeric liquid crystal display display that is included on the development board This module of the prototype heart rate monitoring system is designed to be interactive and provide user control to the heart rate calculation process while demonstrating some concepts related to computer engineering such as microcontrollers embedded systems software development hardware software co design etc The heart rate monitor developed in this research work has thus been designed to present a prototype device that can be used to demonstrate several key concepts related to computer and electrical engineering and this thesis document contains design and implementation details related to the development of this device *A Microcontroller Based Multi-channel Heart Rate Measurement System* Benham Bastani,S. J. Harrold,Electrical Engineering and Electronics,1992

Cardiac Patients Monitoring at a Distance Christo Ananth,2017-11-01 Nowadays the number of heart attack patients is increasing day by day Though it is tough to save heart attack patients we can increase the statistics of saving the lives of those patients as well as the lives of those whom the heart attack patients are responsible for The main design of this project is to track heart attack patients suffering a heart attack during driving send them medical help and stop the vehicle they are driving to ensure that the persons along them are spared from accidents An eye blinking sensor is used to monitor the eye blinking rate and a spO2 sensor is used to check the pulse rate of the patient Both are connected to a micro controller If eye blinking stops then the signal is sent to the controller to make an alarm through the buffer If the spO2 sensor perceives a variation in the pulse rate or low oxygen content in the blood which may result in heart failure then the controller stops the

motor of the vehicle Then a Tarang F4 transmitter is used to sent the vehicle number and the mobile phone number of the patient to the nearest medical station within 25 km for medical aid The pulse rate monitored via LCD The Tarang F4 receiver acquires the signal and passes through the controller the number gets displayed on the LCD screen and an alarm is produced through a buzzer as soon the signal is received Five topics are discussed in this project detecting the patient BPM and the eye blinking status transmitting via Tarang F4 in case of abnormalities in the patient the patient status is displayed and indicated by a buzzer the hospital unit receives the patient s mobile phone number and car number and the communication between the vehicle and the hospital through Tarang F4   **Report of the 12th Meeting of the Technical Advisory Group** ,1991   *Designing a Heart Rate Monitor Interfaced with Bluetooth for Wireless Transmission of Data* Aaresh Sharma,2017 Abstract With advancements in technology and people being more conscious about their health than ever technical advancements in the field of medicine are inevitable People are switching towards wearable devices to keep track of their health and fitness related data This project looks into the development of a heart rate monitor to keep track of the user s heart rate The report presents the development of a heart rate monitor interfaced with a Bluetooth module to wirelessly view related data on a smartphone or any other Bluetooth compatible device The heart rate monitor developed uses the photoplethysmography PPG principle to calculate the heart beats per minute The PPG module developed is then interfaced with an Arduino Uno board responsible for calculating the beats per minute It then transfers the serial data to a Bluetooth module which transmits the data to another Bluetooth compatible device The results show that the heart rate is successfully transferred over Bluetooth and could be helpful in emergency or monitoring situations   **Bluetooth Wireless Heart Rate Telemonitoring** Wan Fairuz Jamilah W. Mohd. Ridzwan,2011   **MC68HCll Microcontroller Based Heart Preventricular Contraction Monitor** Fereidoun Safiri,1989   Development of Wireless Heart Rate Monitor ,2015   *Development of a Heart Rate Variability Measurement System Using Embedded Electronics* Naresh Kumar Velmurugan,2014 Recent advances in embedded electronics have a remarkable influence on the health care system One of the most important applications is to monitor the health care of the patients at anytime and anyplace In the last two decades many researchers have focused mainly on heart rate variability HRV measurements Patient s heart rate variability should be continuously monitored to help them in case of emergency Under these circumstances patients are required to have a HRV measuring kit for a constant observation The proposed project focuses on the development of a heart rate variability measurement system with the use of embedded electronics This project consists of two systems transmitter and a receiver side system The transmitter section composed of sensor amplifier processing unit and display unit and transmitter module The sensors which are pasted on the body are used to sense the electrical activity of the heart These electric signals are given to an amplification unit This amplification unit is designed with IC ADS1293 to amplify and filter the signals and also reduce the noise The output of the amplifier is given to the processing unit Here the microcontroller is programmed to

process the input signal and calculate the heart rate The output of the microcontroller is transmitted to the display unit The display unit shows the current value of the heart rate The continuous measurement of heart rate variability is done in the transmitter side system In case of abnormalities a GSM module is used to transmit the heart rate alert which has been processed by the control unit to the user s mobile phone and GSM receiver modem In the receiver system GSM receiver modem receives the data and processed with Visual Basic program to display and in the mobile phone data is received and displayed as a text message This kind of health monitoring system can offer flexibility and cost saving options to both health care professionals and patients   **Design of a Wireless, Real Time Heart Rate Monitor** Michelle Chislett,2003   **A Real-time Measurement System for Heart Rate Variability Based on Microcontrollers** □□□,2013

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