RFID BASED HEALTH CARD SYSTEM IN ATM

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Abstract— RFID Based health card system in ATM can help an individual to check the medical parameters such as Blood pressure, Heart beat, Body temperature, using appropriate sensors after swiping the RFID Card of the person in the RFID reader which is interfaced to the PIC microcontroller. The whole system can be installed in ATM, petrol pumps, and all public places such as railway stations, bus stops etc, so that the person who is new to a place(ie he may be travelling), if he feels any discomfort in his health condition, he can check his Blood pressure, Heart beat, Body temperature without going to a hospital. If that person is having an abnormal or critical condition, proper medical assistance is provided by informing ambulance service of nearby hospital and also informing the health condition and present location of that person to family through GSM module interfaced with PIC microcontroller. Also it allows us to access the health parameters from anywhere by swiping the RFID card in the RFID reader. In this paper, we propose a system that will reduce the time to be spent in hospitals and allows consumers can maintain their own health and wellness.

Index Terms— GSM, PIC microcontroller , RFID technology.

I. INTRODUCTION

As the nation's healthcare infrastructure continues to evolve new technologies, it promises to provide readily accessible health information that can help people to address personal and community health concerns. In general wearable and implantable medical sensors and portable computing devices present many opportunities to provide timely health information to physicians, public health professionals as well as consumers. Also a remote health monitoring system will helps to reduce the cost of healthcare and to simultaneously improve the quality of the healthcare. Patients may spend less time in hospitals and it allows us to maintain detailed health data, measured by wearable sensors as they go about their daily activities.

The main aim of this work is to implement a remote healthcare monitoring system which include monitoring the medical parameters such as Blood Pressure, Heart Rate, Temperature, are designed and interfaced to the PIC microcontroller. This microcontroller having inbuilt ADC which converts the sensors input analog signals to digital signals. In this a RFID card is given to each and every individual, which connect to the data base of the hospital from where the RFID card is provided. From database the basic information about the person such as name, address, photo, etc can obtained A individual, who want to check his physical condition must swipe the RFID card in the RFID reader attached to the a microcontroller in the setup. The display, which attached to this setup, will display all the details of the individual, who swiped the RFID. After fixing the equipment the person select a button to start the test. Then options to end the test or to continue with other test will be selected. Other test would be selected by continue with other test option. Also if we end the test then the result of the particular test gets displayed on the PC and the health condition of the patient is sent as a message to the persons mobile number through GSM and also it gets stored in the data base which is owned by the healthcare management unit through a network for future reference and also the medical advice is given by the physician in the healthcare management unit. If that person is having abnormal or critical condition, proper medical assistance is provided by informing ambulance service of nearby hospital and also informing the health condition and present location of that person to family through GSM module interfaced with PIC microcontroller.

II. LITERATURE SURVEY

A. Health Monitoring With Body Sensors

For in-home patient monitoring, Wireless Sensor Network (WSN) is also used. A distributed tele monitoring system was proposed in [8]. It uses Services layers over Light Physical devices(SYLPH) model. It uses service oriented architecture model. The main objective is to distribute the resources among multiple WSN. Different networks with varying wireless technologies can also be connected using this model. In [6], Infrared (IR) sensor based system was proposed. It was installed in house and collects the motion values of the patient and different feature values like activity level, mobility level and non-response level. Support Vector Data Description (SVDD) method was used to differentiate normal and abnormal. Behavior pattern classification algorithm was used to classify the behavior patterns here. These schemes were expected to be applicable in home environment but there is no proof.

The major challenges of health monitoring system like sustainable power supply and Quality of Service (QoS) were efficiently solved here. A survey on wearable sensor based system for health monitoring was discussed in [1]. Different systems were evaluated based on evaluation features. The use of PC was eliminated in [10]. WSN was installed at home. Then it was connected to the hospital sever through internet. Only ECG signals were collected using group of sensors. Initially ECG signals were sampled and transmitted to the access point which is placed in patient's home. Then they were transmitted to the hospital through internet and analyzed to detect heart related diseases. Multiple patients who were monitored with ECG sensors was discussed. ECG sensors are fitted on the chest of the patient to get heart related information like heart rate, heart activity, etc. Here the patients are considered as nodes of the network and hospital is acting as a central node. Two modules were used here: patient home and hospital.

In the home module, continuously monitored heart related data were transmitted to the Wireless Patient Portable Unit (WPPU) which is also embedded on patient's body. Then it was forwarded to the hospital using Wireless Access Point Unit (WAPU) through internet. In hospital, any abnormalities were identified from the received signals, the doctor can contact the patient and gives some advice or sends an ambulance to the corresponding patient's home, in case of any emergency. There is no outdoor environment monitoring and no security in this system.

B. Health Monitoring Using Smart Phones

The sensor network in [7] was based on sensors placed on clothes. The patient's vital signs were collected by the sensors and are transmitted to the mobile phone which is carried by the patient. The mobile phone securely receives, stores and forwards the data to the trusted medical professionals. The patient only controls the accessibility of data to other parties. All the processes are done by mobile phone and PC was not used here. Data mining techniques were used to filter the unwanted data sequences and only the necessary data are transferred by the handheld device. Bluetooth or WLAN 802.11 was used to communicate between patient's mobile and expert's device. Emergency calls are generated by patient's device and forwarded to the caregiver's device in case of any emergency conditions .

A novel Wearable Mobility Monitoring System(WMMS) was introduced in [2]. It used smart phone and took photographs when a change of state was detected. On demand positioning and tracking system was proposed in [3]. It was based on Global Positioning enabled devices and suitable for large environments. Smart phone was used between two terminals for making initial communication. In the synchronization phase initial communication is performed. Here requesting terminal T1 sends synchronization Short Message Service (SMS) to the requested terminal T2. If T2 refuses the message, it finishes the process. Otherwise, the location of the terminal is sent in any one of the format like text format (SMS) or multimedia format (MMS). Only the coordinate values of the terminal were present in the text format, but the image which represents the map of the terminal's location was present in the multimedia format. The communication between two terminals is accomplished by simple Peer to Peer (P2P) protocol.

III. PROPOSED SYSTEM

To implement a remote healthcare monitoring system. In these sensors to monitor the medical parameters such as, Blood Pressure, Heart Rate, Temperature, are designed and interfaced to the microcontroller PIC16F867A . This microcontroller having inbuilt ADC which converts the sensors input analog signals to digital signals. PIC16F876A devices are available only in 28-pinpackages, while PIC16F874A/877A devices are availablein 40-pin and 44-pin packages. All devices in the PIC16F87XA family share common architecture.

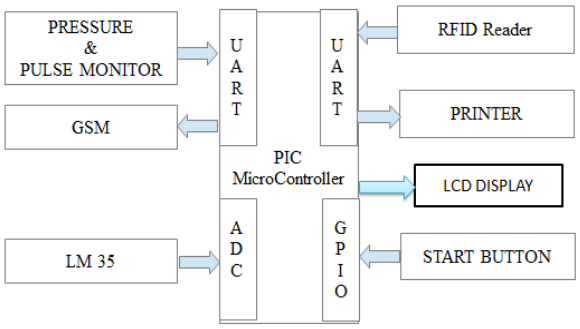

Figure 1: Block diagram of the proposed system.

Apart from PIC16F876A Micro controller the proposed system consists of several distinct components, including:

A .RFID Card and Reader

The EM-18 RFID Reader module operating at 125kHz is an inexpensive solution for your RFID based application. The Reader module comes with an on-chip antenna and can be powered up with a 5V power supply. Power-up the module and connect the transmit pin of the module to recieve pin of your microcontroller. Show your card within the reading distance and the card number is thrown at the output. Optionally the module can be configured for also a weigand output. The EM-18 RFID Reader module generates and radiates RF Carrier Signals of frequency 125KHz through its coils. When a 125KHz Passive RFID Tag (have no battery) is brought in to this field, will get energized from it. These RFID Tags are usually made using a CMOS IC EM4102. It gets enough power and master clock for its operations from the electromagnetic fields produced by RFID Reader. When a RFID Tag is bring in to the field of EM-18 RFID Reader, it will read its tag number and give output via TX terminal. The BEEP terminal will become LOW to indicate valid tag detection. The UART output will be 12 ASCII data, among these first 10 will be tag number and last 2 will be XOR result of the tag number which can be used for error testing.

B. Sensor Unit

Blood Pressure Sensor

Hypertension is a critical risk factor for cardiovascular morbidity and mortality in the general population and reduction of blood pressure (BP) with effective antihypertensive therapy significantly decreases cardiovascular morbidity and mortality [6]. Keeping observing BP is also a matter of concern for those who have hyper-tension, coronary heart disease and other cardiovascular diseases. BP measurement is also important for particular disease patients, such as haemodialysis patients. Hence, in the daily life, BP

measurement and management is very useful for handling health situation and plays a preventive function. [6] Many researches point out that the importance of BP measurement and management for elder and hypertensions. Elderly people usually have higher BP, prone to take sick, and the morbidity of BP disease is higher. In patients with hypertension, BP measurement and management warn patients to take medicines and make prevention about diet, to get treatment effect.

Blood pressure is comprised of two types [6]:Systolic pressure (the force of blood in arteries as the heart contracts and pushes it out) and diastolic pressure (the force of blood in arteries as the heart relaxes).The measurement system of blood pressure can be classified into two categories: Invasive (direct) and Non-invasive (indirect).

Invasive techniques of BP Measurement involve inserting a catheter into the vascular system which brings high risks of arrhythmia, embolism, heart attack as well as certain percent of mortality. Also this method is not very convenient for day to day applications [6]. This can be used only when absolutely necessary. The non-invasive devices are more safe, easier to use and also can be utilized in many of the situations. Various non-invasive methods are available like Electronic Palpation method, Volume Oscillometric (VO) method, Volume Compensation (VC) method, Arterial Tonometry method etc. Among those auscultator methods, Oscillometric methods are continuous.

Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature[.Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package.

C. GSM Module

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz. The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip(MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply . Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet ect through simple AT commands.

D. Thermal Printer

The PNP-64 is a 'Plug & Play' type 2 Inch Thermal Panel Printer Module which enables the OEM users to avoid hassles like mounting mechanism, paper roll, developing control board etc.

IV. PROPOSED ALGORITHM

The main aim is to implement a remote health card system which include monitoring the medical parameters such as Blood Pressure, Heart Rate, Temperature, are designed and interfaced to the PIC microcontroller. This microcontroller having inbuilt ADC which converts the sensors input analog signals to digital signals. In this a RFID card is given to each and every individual, which connect to the data base of the hospital from where the RFID card is provided. From database the basic information about the person such as name, address, photo, etc can obtained.

A individual, who want to check his physical condition must swipe the RFID card in the RFID reader attached to the a microcontroller in the setup. The display, which attached to this setup, will display all the details of the individual, who swiped the RFID. After fixing the equipment the person select a button to start the test. Then options to end the test or to continue with other test will be selected. Other test would be selected by continue with other test option. Also if we end the test then the result of the particular test gets displayed on the PC and the health condition of the patient is sent as a message to the persons mobile number through GSM and also it gets stored in the data base which is owned by the healthcare management unit through a network for future reference and also the medical advice is given by the physician in the healthcare management unit. If that person is having abnormal or critical condition, proper medical assistance is provided by informing ambulance service of nearby hospital and also informing the health condition and present location of that person to family through GSM module interfaced with PIC16F876A. The result is printed through the thermal printer in which location of nearest hospital (only if person need immediate medical assistant) is also included.

V. SIMULATION RESULTS

The data can be transmitted from one location to another location, which can be displayed in virtual terminal. LCD will display the varying value of potentiometer. The current value of potentiometer will be continuously displayed in virtual terminal window, if not varying the potentiometer.

When no RFID card is inserted text to insert the RFID card will be displayed When the RFID card is inserted the option to start particular test will be displayed fig 2. The output result is displayed in the lcd display. The result is printed through the thermal printer and the result is sent through GSM Module to family member.

Figure 2: Data transmission when RFID card is swipe

Table: Results showing Health Conditions

User	Sys. Pressure (mm/Hg)	Dia. Pressure (mm/Hg)	Pulse Rate (/sec)	Temp. (degree celcius)	Status
A	151	93	87	31	Abnormal
B	119	80	72	32	Normal
C	142	90	80	30	Abnormal
D	121	78	72	30	Normal

VI. CONCLUSION

Through this paper, we take the initiative of helping the old peoples to check health parameter without going to the hospital. This system help us to update current health condition even though if we are new to a place and doesn't know where the hospital is. The weighing system in the railway station and bus stop can be upgraded with this work. Blood glucose sensor can be also added to the proposed as a upgrade for checking blood glucose. The result will be stored in the database of the medical healthcare unit. This allows physician in the healthcare unit to send medical advice to send medical advice to the individual.

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