Design Remote of Management and Follow Up of Chronic Diseases Based on ATmega32

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Abstract. It is critical for patients in general, and especially for patients who need to take their medication on a regular basis (diabetics and hypertension, etc.), to be reminded. This common observation shows that people are more concerned with their work and other obligations than with their health. The device accepts medication parameters (amount and time) as well as temperature and humidity via keyboard, allowing control settings to be set and then send SMS message to the doctor's phone number via AT commands when patient's medication intake time is due. In addition, the system can operate fan or sucking fan according to patient's needs. It concludes that the system has greater impact in medical field since it satisfied the missed objectives in now days' technology through, low cost as well as giving the best solution to patient environment as essential parameter in health recovery.

Key words: remote management, chronic diseases, ATmega32, patient, reminding, health recovery.

Introduction

Until now, telemedicine has mostly been utilized to manage chronic diseases.

Chronic disorders like diabetes, heart disease, and asthma account for 70-80% of healthcare spending.

By 2023, the expenditures of these diseases are expected to exceed USD 4.3 trillion (Versel, 2012). Chronic diseases account for roughly 70% of all deaths in the United States each year, with approximately 133 million Americans (roughly one in every two adults) suffering from at least one chronic illness (Centers for Disease Control and Prevention, 2009).

Nursing is defined by the World Health Organization (WHO) as "a knowledge and art that looks after human as a whole (body-mind-soul) to assisting, protecting, observing, and caring for the needy person with handful recovering, instantly, when he/or she is ill, so by taking care of all the environment around him, such as the room's temperature and ventilation to keep him healthy, concurrently" (WHO, 2021).

Where the nurse's role should not be limited to when the patient is in bed at the hospital, but should extend beyond that and be ongoing in order to help the patient feel at ease and confident.

The authors Julius and Jian-Min (2017) tried to shed the light on an IOT Based Patient Health Monitoring System using LabVIEW and Wireless Sensor Networks was suggested. This system has many sensors to measure heart signal ECG, blood pressure, temperature degree and oxygen level, uses Arduino plate (Meg2560) and lab view 2014

systems for detecting these signals. Patient data will be stored as a cloud to so the doctors can participate in one time.

A system was designed which uses a medical interference from anywhere and anytime using the GSM and GPS technologies. The design and application of monitoring system for patients remotely by using GSM cellular technology, where the system sends SMS message to the doctor or the person in charge of monitoring the patients' health, the technologies used here are practical, easy, not expensive and very effective in vital data transfer to healthcare providers. This system is based on Android which easy to use application, it works on smartphones and tablets where the application records SMS messages and save it on the database (Aziz et al., 2016).

A Real-time Heart Pulse Monitoring Technique using wireless Sensor Network and Mobile Application was suggested, the system which monitor heart beats in real time and display the results on smart phone and computer. Sensors technology is used to monitor the beats by finger print through (Arduino) controller with (Ethernet shield), so the results can be received through internet anywhere. The suggested system is easy to use. Give an efficient result in short time plus its low lost. (Ali et al., 2018: 5118).

It is essential for patients in general, along with patients who needs constant medication (diabetics and hypertension, for instance), to be reminded. This common view shows that people are so concerned with their work and other activities than it is with taking care of one's self.

The aim of this study is to design and implement remote management and follow up of chronic Disease based on ATmega32 by using high efficiency and precision sensors, as well as local communication networks.

In order to create a working prototype that does the following:

1. Control the rooms environment mainly temperature and humidity according to patient requirement.

2. Automatic medicine reminder.

Material and Methods
Research Plan
The primary methods for achieving the goals and objectives of the Project will be:

Professionals must gather and pick a suitable microcontroller, GSM modem, with high precision in order to offer the needed communication for monitoring additionally, sensors or input switches can be utilized to connect the microcontroller to the outside world.

A programming language is necessary to link the various parts of hardware together to perform the desired purpose. At different phases of the development process, several types of software are required: editors to produce and edit code; compilers to convert code to a machine-readable format; device-programming software to download the machine code to the target; and so on.

Validating systems by comparing their results to those of industry-standard medical equipment.

Flow chart of the system
The flowing diagram represent the flow chart that describes the procedure are sequences used in software design:
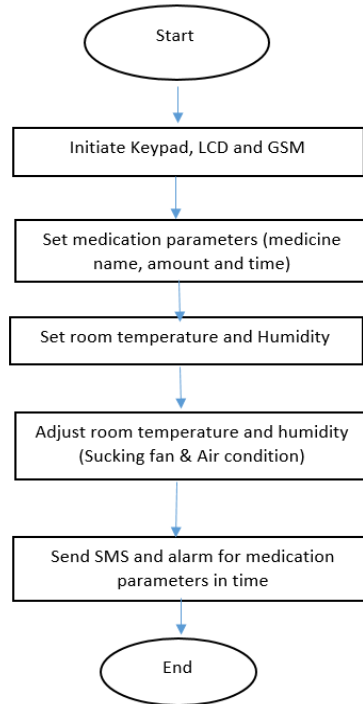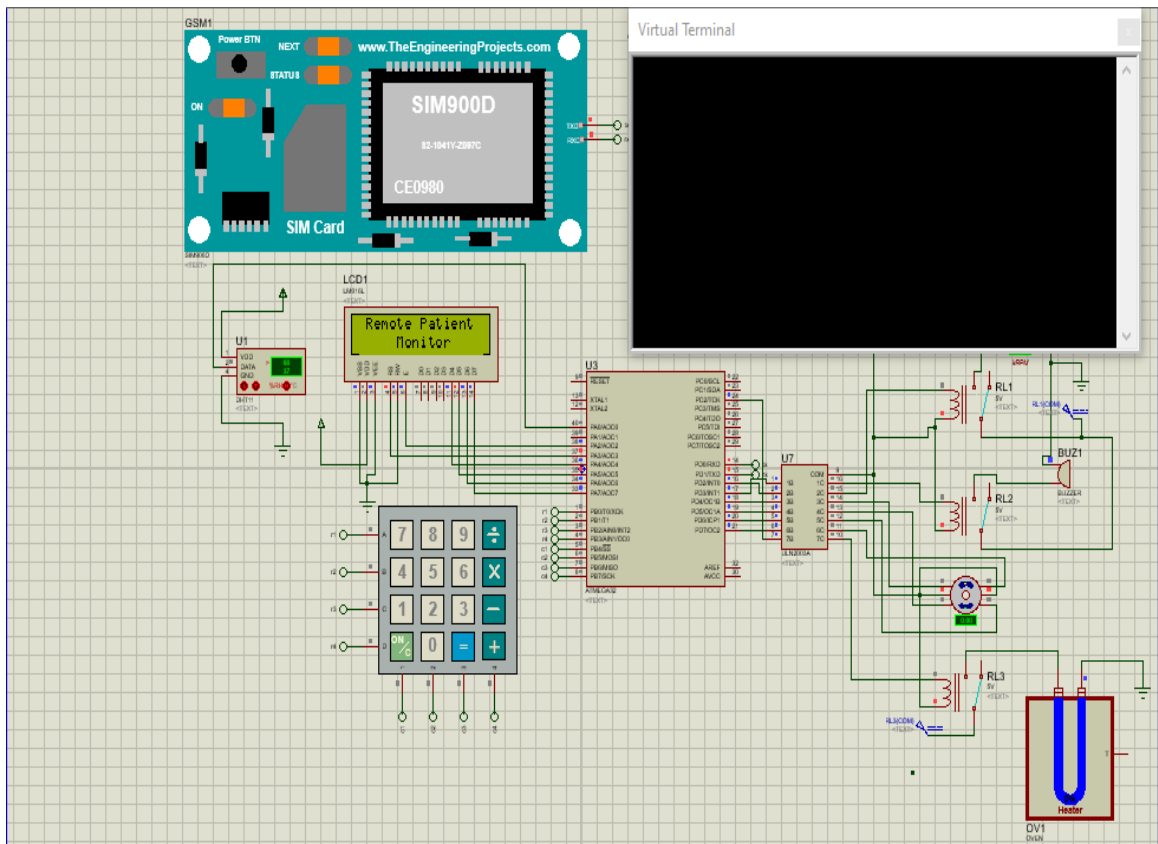
Fig. 2. Flow chart

Design

Fig. 2. Simulated system (Source: Author)

The figure above shows a simulated proposed system. The components that are used either essential to the above components or are used for a specific function. These elements are summarized in Table 1.

Table 1. The components

Component	Usage
ATmega32	Collect the data via input units, then it will process the values.
GSM Shield SIM900A	Send SMS to medical staff on his cell number
DHT11	Measure room's temperature and humidity
LCD	Displaying data,
Fan	Reduce heat.
Relay	Operate the fan and Sucking fan.
Buzzer Module	Generate sound when it will be electrified.
SIM card	Required by GSM module.
5v DC	Powers the circuit components.
Proteus simulator	Design and simulate electronic circuits.
Arduino Software (IDE)	Edit code for Arduino and program it.
Source: Author	

Results and Discussion
Medication Reminder System:
We adjust the number of medication that the patient requires and the system auto generate all medication sub parameters like (amount and time).
Room's
Environment Control system
We adjust temperature and Humidity set point in which the temperature controller starts to adjust the fans speed and the heater to meet the targets temperature and humidity.

Table 2. Comparing Rooms Temperature / Humidity outputs with actual outputs

Time	Room temperature (^{o}C) Reading		Humidity readings (%)	
	Standard	Proposed	Standard	Proposed
10:00AM	25.3	25.2	7	7
1:00 PM	25.6	25.5	5	5
4:00 PM	24.8	24.9	11	10
7:00 PM	25.7	25.6	8	8

As shown in Table 2, a suggested system's temperature readings are similar to those of conventional devices, indicating that device readings are within acceptable limits.
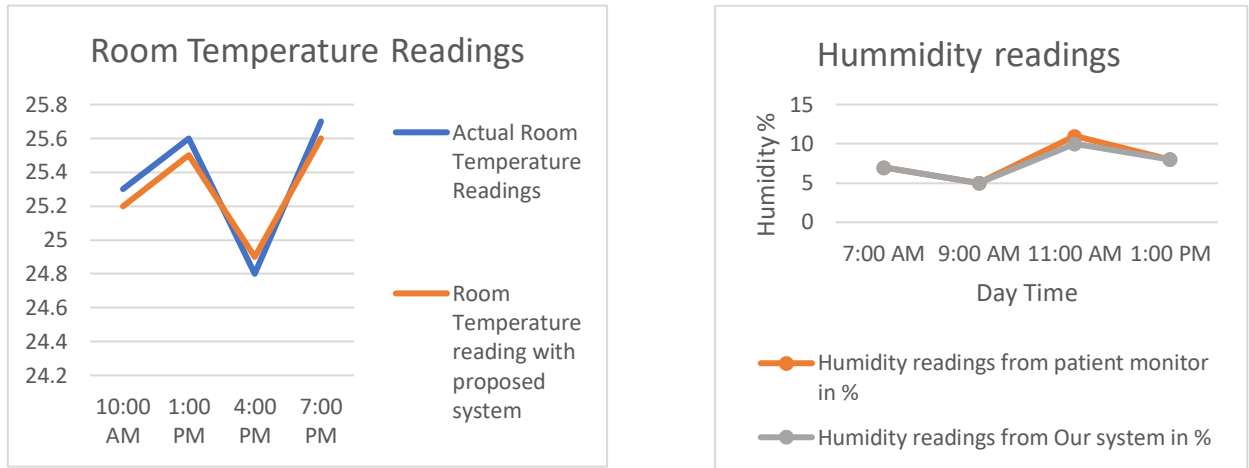
Room Temperature Readings

Humidity readings

Fig. 3. Comparing room temperature & humidity outputs with actual readin**g**

From the above figures, the temperature & humidity reading from the patient monitors in discrete periods of time are similar to proposed system which illustrates how closely patient monitor devices' readings match our proposed system's precision and accuracy, as well as their standard range.

Conclusion
The system has two modes of operation: the first is programmable medication reminders, which assist patients in taking their drugs on time and in the correct dosage.

The second approach is to use sensors to manage the room environment, including temperature and humidity, according to the patient's needs.

To integrate this system and to solve the problem of crowdedness outside patient room through monitoring during visitor's time we must activate security system through electronic lock microcontroller technology to the gate and then send SMS to nurse with activating buzzer System can be modified to output a video stream in case of patient room crowded with visitors to leave the room through voice alarm from the doctor or nurse staff.

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