

IoT Based Intelligent Medicine Box with Assistance

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Abstract

In this paper, the intelligent medicine box has been designed. This medicine box stores the medicines and which alerts and remind to patients to take the medicines time to time. So that it avoids the health hazards due to negligence of not taking medicines time to time. Also in this paper different health parameters such as pulse rate, blood pressure and temperature and ECG of heart are measured. These parameters are sent to firebase IoT. Doctors can monitor health parameters on firebase website and accordingly decisions can be taken about patient treatment.

Key Words

Firestore IoT, Health monitor, ECG Sensor, Temperature Sensor, Pulse Sensor

Introduction

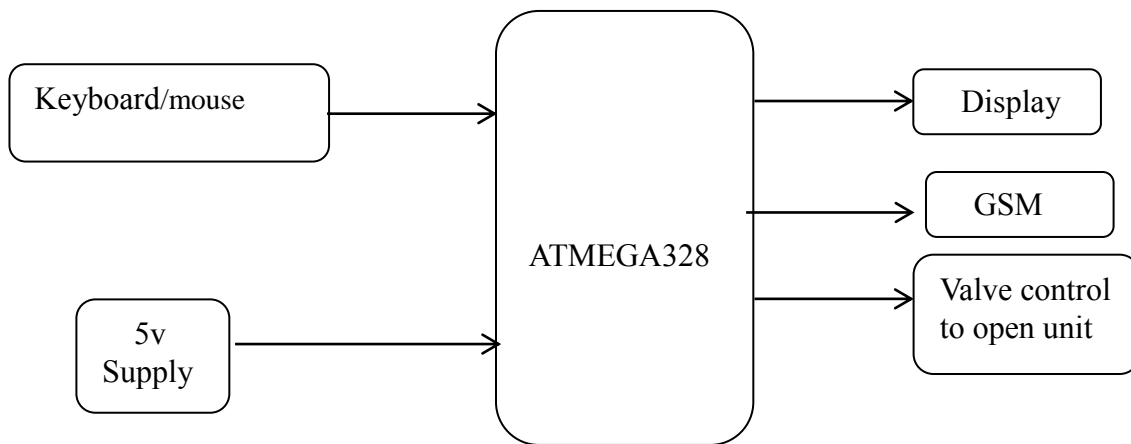
Now days, global aging and the prevalence of chronic diseases have become a common concern. Many countries are undergoing hospital restructuring by reducing the number of hospital beds and increasing the proportion of home healthcare. A promising trend in healthcare is to move routine medical checks and other healthcare services from hospital (Hospital-Centric) to the home environment (Home-Centric). By doing so, first, the patients can get seamless healthcare at any time in a comfortable home environment; second, society's financial burden could be greatly reduced by remote treatment; third, limited hospital resources can be released for people in need of emergency care. In-home healthcare and services can drastically reduce the total expenditure on medical care or treatment. In order to track the physical status of the elderly and, in the meanwhile, to keep them healthy, the following two daily tasks are essential: 1) real-time monitoring and analyzing vital signs to early detect or predict life-threatening adverse events; and 2) checking whether they are following their prescribed treatment, including taking their prescribed medicine on time. Medication adherence is the degree to which a patient correctly follows the medical advice and Medication non-adherence is referred to negligence and delays in taking your medicines, not following your prescriptions or even neglecting medication. Medical Non-adherence also refers to altering medications and taking medications in combinations. Studies show that in developed countries, medical adherence is about 50%. The situation in developing countries is even worse. The problem of medication non-adherence is critical because of 1) Forgetfulness in the case of elders, 2) Inability to read and understand the prescription and the names on the medicines, and 3) Lack of resources and knowledge to utilize the various mobile based medication reminder applications. Medication non-adherence can have severe negative consequences for the patient. It may lead to adverse outcomes like health related problems, and even increased duration of treatment with higher cost. The available solutions can be divided into Software based and Hardware based methods. The device proposed in this project is a hardware based solutions. It is required to be fed in with the medication pills and their schedule by the doctor, the doctor's assistant or some literate family member (caretaker). The device then notifies the medicine to the patient at the required time.

Literature Review

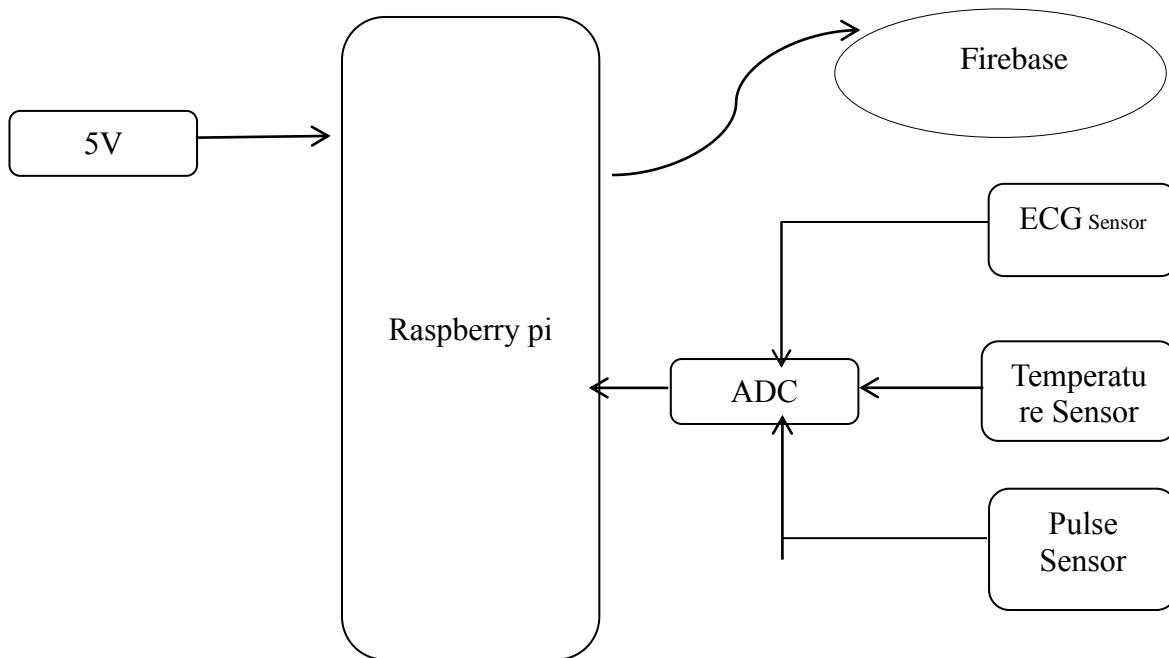
The use of health monitoring systems by skilled clinicians with critical care experience will reduce the hospitalization rate, save large amounts of money, provide more effective home health management for patients with diabetes, and improve the health care system in general by reducing the use of inpatient services. Decision-Support System (DSS) frameworks provide the mechanism with which clinical data from tele health devices is analyzed. This paper will also show the importance of DSS in tele health management systems for all patients with a chronic disease, not just those with diabetes. Tele health systems are a practical and cost-effective way of providing care to chronically ill patients by enhancing health care providers ability to provide quality care in patients' homes and delay, or sometimes even eliminate, the need for expensive hospital admissions or

traditional nursing home care. Remote patient monitoring, which tracks and monitors patients, also offers more frequent contact between the patient and the primary care provider, provides early detection of potential problems, and allows real-time alerts, resulting in a proactive, affordable option for best-practice health care. Home Tele monitoring for Chronic Disease Management: An Economic Assessment, analyzed the consumption of health care services by 95 patients with various chronic 5 month without technology. They find out there is a large reduction in number of hospitalizations, length of average hospital stay and, to a lesser extent, number of emergency room visits. Survey also found that the use of tele monitoring systems will save more than \$1557 per patient as calculated on annualized basis, This represents a net gain of 41% as compared to traditional home care.

Block Diagram



Block Diagram 1



Block Diagram 2

System working

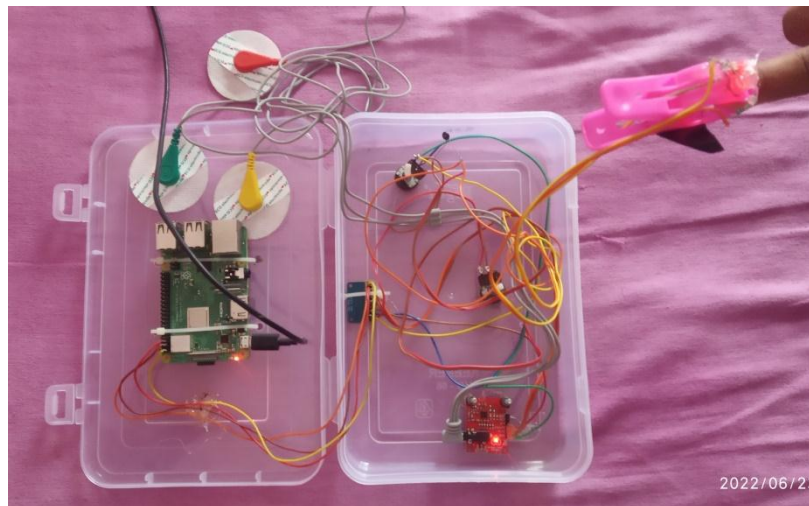
Here two units are available one is GSM timer unit, and second is sensor unit. In GSM timer AVR Arduino board using LCD 4 bit mode interface. It shows message to take medicines time to time according to medicine name as fixed in time table. LCD 4 bit mode interface with AVR at mega 328. Relays are used as switch for medicine box to lock and unlock. Relays work as wall driver. When it is time to take medicine according to time table GSM modem conveys message to patient's mobile. When this unit connects to supply then it starts to count time and at setting time this alerts to patient or care taker and it send message to patient.

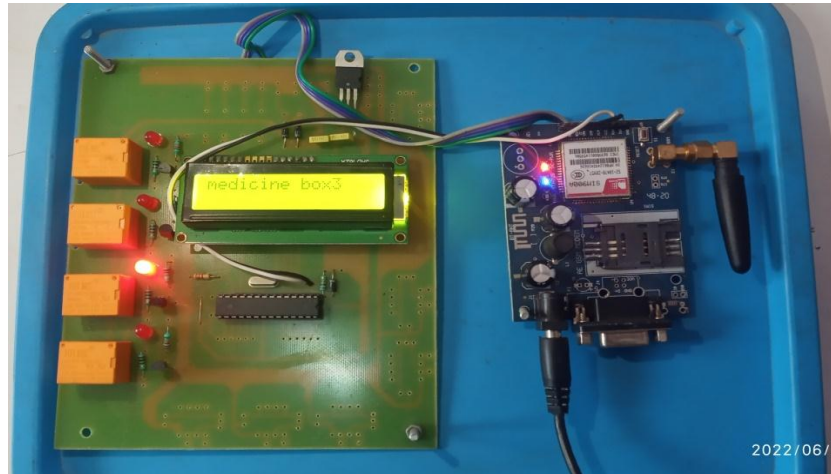
Second unit is measuring parameters sensor unit. In this unit measures different parameters of patient. Like temperature, blood pressure, and ECG of heart. For this unit NTC type thermistor used for measuring human body temperature and pulse sensor is used for measuring human blood pressure, and ECG sensors are used for measuring ECG of heart. It shows electrical conditions of heart. After measuring these parameters the outputs of these sensors are given to ADC converter and ADC converts this data analog to digital form.

ADC ADS1115 is interface with raspberry pi, it is 4 channel I2C, ADC with 16 bit resolution. So ADC channel 0 is connected to ECG sensor module, channel 1 is connected to temperature sensor 100 k NTC type thermistor, channel 2 is connected to blood pressure, blood pressure is measure depending on the light absorb by fingertip.

This measured data can be upload on website. Doctors can see this data on website on his phone. Doctor can monitor patients data. For that purpose firebase system used by opening an account on firebase system patient data couples on raspberry pi. Raspberry is pi 3b+ model. 16 gb sd card raspbian stretch OS installed firebase libraries included patients data takes in raspberry pi and upload it on website. Doctors can monitoring this continue.

Result





Conclusion

In this paper we design a medicine box in which patient can measure his different parameters like blood pressure, body temperature, ECG parameters. These measured parameters are sent to IoT website through firebase website. And by using this site doctor can monitor patient's health condition. In this box at fixed time GSM unit send message to patient to take medicine time to time. And alerts patient to take medicine at that time.

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