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Medical Diagnosis Chair

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ABSTRACT
Often a huge amount of efforts are invested in ferrying old or ill people to laboratories for medical diagnosis. That also involves troubles like repeated investments and in addition a pile of reports that are often messed up. Finding a particular report is always herculean. Solutions to all these troubles is MEDICAL DIAGNOSIS CHAIR. This Medical Diagnosis Chair is almost a mini-laboratory. This can also stay connected with laboratories, doctors and family members. It eliminates the old people to the laboratories and also avoids the piling of reports. The functions of MEDICAL DIAGNOSIS CHAIR are a set sensors are used to find Blood Pressure and Heart Beat count. If there are any fluctuations in heart beat is reported and the alarm is raised and voice call is initiated. At regular intervals reports are generated and stored in local memory as well as transmitted. The hardware section includes the Arduino Galileo Gen2 board, Blood Pressure sensor, Pulse rate sensor, Capacitive touch sensor, GSM shield and memory card.

I. Introduction

The main objective of the paper is to provide a close medical diagnosis continuously from any place. That can be shared with the doctors and can be monitored. The kit is capable of converting any chair that gets connected with the kit turns into a MEDICAL DIAGNOSIS CHAIR - " MEDGAIR". The patient is made to come in contact with MEDGAIR via some sensors whose functions varies from monitoring of pulses, monitoring blood pressure. Then storing those results and sharing the same specific persons via GSM module. The system also comes up with buzzer that gets turned - on with the high fluctuations in heart beat or by the use of Touch Sensor in times of emergency. This can also stay connected with laboratories, doctors and family members. It eliminates the old people to the laboratories and also avoids the piling of reports. The functions of MEDGAIR are a set sensors are used to find Blood Pressure and Heart Beat count. If there are any fluctuations in heart beat is reported and the alarm is raised and voice call is initiated. At regular intervals reports are generated and stored in local memory as well as transmitted.

II. System Overview

The proposed system consist of Arduino Galileo Gen2 board, Blood Pressure sensor, Pulse rate sensor, Capacitive touch sensor, GSM shield. After the Intel Galileo board is powered - up, wait for the LED of micro USB to glow. Once it glows dump the code into Intel Galileo board which is interfaced with the above mentioned sensors and output peripherals. This is achieved only with the help of Arduino IDE. Once it is done the code is on the go and starts working. Now check the serial monitor to know the instantaneous values. The readings that are measured are often calibrated and compare with the values desired with the patient's body conditions. When the values derived are not in the preferred ranges the buzzer is raised and a voice call is initiated to the initial defined mobile numbers using GSM Shield.

In case there is any emergency the patient can raise an alert with the help of capacitive touch sensor.

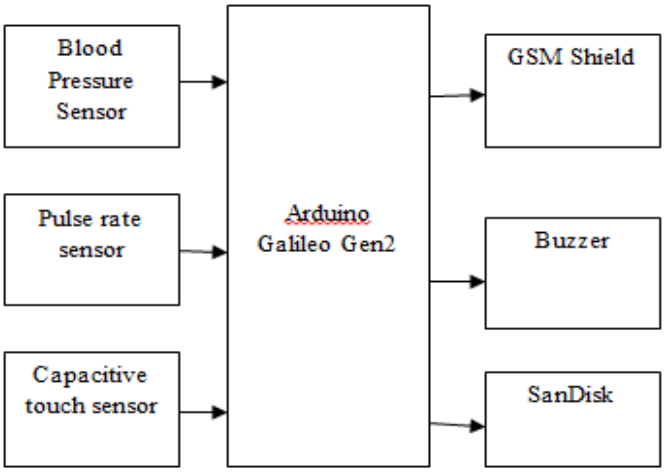

Figure1. Block Diagram.

III. Hardware Requirements

A. Arduino Galileo Gen2

There are different types of embedded processors hardware boards among them the most famous are Raspberry pi, Arduino Galileo. The devices like Raspberry pi are designed in such a way that they are integrated with things like RAM, unlimited storage, Ethernet but the only thing is that device doesn't have the analog – to - digital converter , because of this analog sensors would not work on Raspberry pi board.

On other side Arduino Galileo Gen2 board based on the Intel Quark SOCX1000 is a 32 – bit Intel Pentium processor, operating at speed up to 400MHz and it supports analog sensors[1]. In this project we used a new version of arduino i.e. Arduino Galileo Gen2 board which is integrated. The board is integrated with Ethernet, micro SD slot, 20 digital input/output pins out of which 6 can be used as PWM outputs and 6 as analog inputs. It operates at a voltage of 3.3V or 5V.

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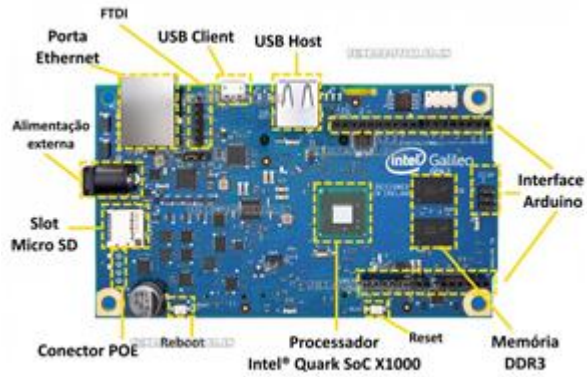

Figure 2. Arduino Galileo Gen2 Board

B. Blood Pressure and Pulse rate sensor

Blood pressure is the pressure of the blood in the arteries as it is pumped around the body by the heart. When your heart beats, it contracts and pushes blood through the arteries to the rest of your body. This force creates pressure on the arteries. Blood pressure is recorded as two numbers. The systolic pressure over the diastolic pressure. High BP can leads to serious problems like heart attack, or kidney disease. Blood pressure and pulse reading are shown on display with serial out for external projects of embedded circuit processing and display. It shows Systolic, Diastolic and Pulse readings. Compact design fits over the wrist like a watch. Easy to use wrist style eliminates pumping. The features of this sensor is it has automatic compression and decompression and easy to operate, switching button to start measuring. The operated voltage is 5V and 200mA regulated[4].

Figure 3. Blood pressure and Pulse rate sensor.

Table 1. Classification of Blood Pressure for adults.

Parameter	Systolic (mm Hg)	Diastolic (mm Hg)
Hypotension	< 90	< 60
Desired	90 - 119	60 - 79
Pre Hypertension	120 - 139	80 - 89

C. Capacitive Touch Sensor

The aim of this sensor is to return a digital signal of "LOGIC 1" when then the touch pad of the sensor is made to come into any physical contact[4].

Figure 4. Touch sensor.

Features

01. It is simple to use and it is auto calibrated.
02. The status can be observed by a status indicator LED that is available on the capacitive sensor module.
03. The output can be configured as Active high when represents LOGIC 1 or the Active low which shall represent LOGIC 0.
04. Output can be directly connected to digital Input pin.

D. Buzzer

It is an electronic signaling device. The principle of the buzzer is it consists of piezo crystals between the two conductors. When a voltage is applied across these crystals, they push one conductor and pull the other conductor due this action it creates the sound. Mostly the buzzers generates sound in the frequency range of 2 to 4 KHz. Buzzer will have two pins one is connected to the input and the other is connected to the ground. Applications of the buzzer are it can be used in alarm devices, Household applications.

Figure 5. Buzzer.

E. GSM Shield

GSM stands for Global System for Mobile Communications. The Arduino GSM shield connects your board to the internet using GPRS. Just you need to insert the GSM shield onto the Arduino board and insert the sim card. You can make the phone calls, receive the phone calls and can send the simple message system(SMS). GSM shield contains a bunch of LED's which will be ON when it gets power. It blinks when it is communicating with the radio network. It has an input pins that can be used to connect the microphone and output pins to connect speaker. So, in order to speak to and hear you need to add a speaker and a microphone.

Figure 6. GSM Shield.

IV. Results

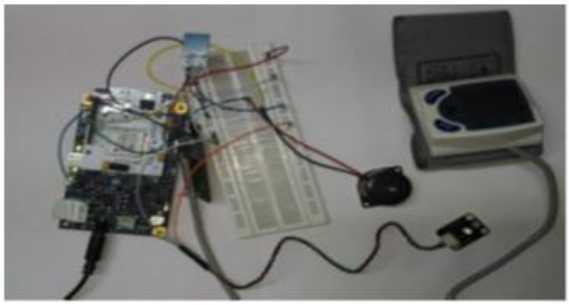

Figure 7. Connection set – up.

The above is the connection set - up of the project that shall include blood pressure and pulse rate sensor, touch sensor, Intel Galileo Gen2 board, GSM Shield, LED, bread board, buzzer and connecting wires. This can be explained in the below block diagram.

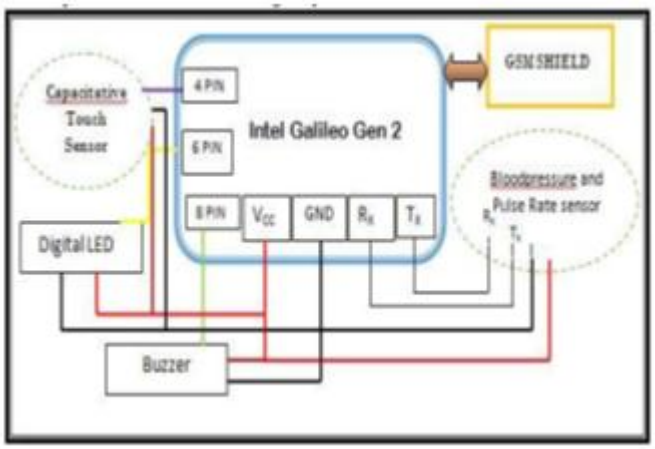

Figure 8. Connection set - up block diagram.

Figure 9. Serial Monitor Output.

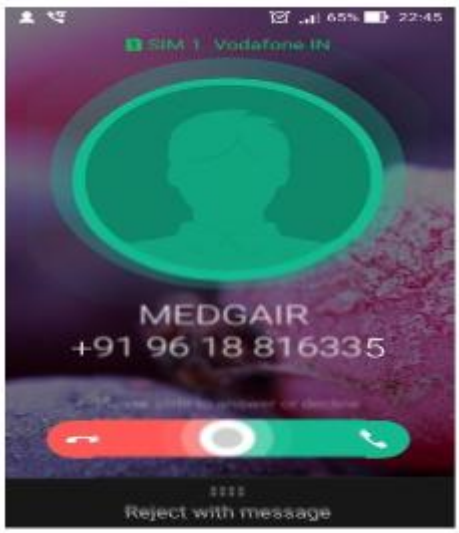

Figure 10. Voice call from MEDGAIR.

V. Conclusion

The existing medical systems are mono - functional. The diagnosis units and medical facilities are dysfunctional. Hence there is a need to ply between these facilities often to get reports regarding the patient. The reports thus generated for the patients during the diagnosis are often in the form of hardcopies. In the continuous diagnosis, the patients shall be often ending up with a pile of reports. But using this system, it shall make the above problems to be put to an end. There is no need to store the hard copies as the values are stored in the local memory. As the solutions include to store the reports in the form of softcopies for a long duration of time. The diagnosis unit and the medical facilities are integrated and shall function as a single unit. If in case of any emergency, the doctor or the family members can be easily alerted and further action can be taken. Thus it recedes the risk of loss of live. As the alerting mechanism can invoke medication or any necessary action that shall be needed to save the life of the patient.

VI. Future Scope

The system can be connected to a central cloud and whenever the diagnosis team changes there would be no need for a new diagnosis. The system can be integrated with several other sensors which should be able to detect other parameters like diabetic levels. A number of such systems can be pooled into a network. Hence those systems can be amalgamated into a single system that can be utilized in a large hospital or say in tele- monitoring which shall support and take the existing tele - medicine to a next level.

VII. References

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