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VITAL SIGNS BASED TREADMILL SPEED CONTROLLING AND ALERTING WITH GSM

K. SREEDEVI[1], D.V.SRIHARIBABU[2]

K. Sreedevi, M.Tech student, Dept of ECE, Kottam college of Engineering, china tekkur, kallur mandal, Kurnool,A.P., India.

D.V.Sriharibabu, Asst, Professor, Dept of ECE, Kottam college of Engineering, china tekkur, kallur mandal, Kurnool,A.P., India.

Abstract:

A system to help patients recovering from heart surgeries and procedures is designed. The pulse width modulation output of an microcontroller controls the speed of a DC motor that simulates a Treadmill machine. The control adjusts the duty cycle of the pulses coming out of the Pulse width modulation (PWM) output of the controller. If the heart rate of the patient running on the machine is lower than a set value recommended by a cardiologist, then the PWM signal increases the speed of the motor to make the patient run faster. If the heart rate of the patient running on the machine is higher than the value set by the cardiologist, then speed of the motor is reduced by the controller. The system was designed and implemented using locally purchased components, which shows that local manufacturing of devices is possible and investors can invest in local companies.

I. INTRODUCTION:

The World Health Organization (WHO) issued several reports encouraging 3rd world countries to locally manufacture medical devices to improve the access of patients to medical devices. Rise of unemployment rates in Saudi lead policy makers to initiate and support entrepreneurship programs to transfer job seekers to job makers. Many Treadmill machines have a "cardio" mode of operation which monitors the heart rate regularly and issues warnings for users if they exceed a certain value. Cardiologists use "stress tests" to diagnose heart diseases.

Patients run on a treadmill machine while their Electrocardiogram (ECG) is monitored through a monitor. The system described in this paper allows the user to set a maximum heart rate he or she can achieve based on the recommendations of a cardiologist. The heart rate of the patient is continuously monitored and fed to a controller while the patient runs on the treadmill machine. If the heart rate is lower than the maximum.

II. HARDWARE SYSTEM

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (LCD) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

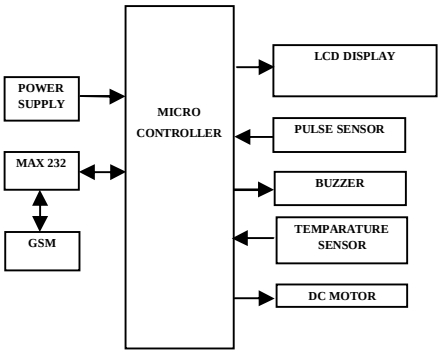

Fig: Block diagram

Now a day's with the increase of biomedical sensor we are going into this process of detecting the patient's real-time heart rate information.

In this project here the system continuously monitors the temperature and heart rate of user. When a person is working on the treadmill machine the system calculates the current heart rate of user. And also a prescribed value is given as normal heart rate as per the health condition of the user. Here the system controllers speed of the motor according the difference between the current heart rate and fixed input i.e. the prescribed heart rate of the user. If the current heart rate of user is normal then the machine runs at normal speed and if the heart rate of the user varies then correspondingly the speed of the motor also changes so as to support the health condition of user. The system also alerts the user when his/her condition is danger also sends message to the particular person by using GSM module present in the system.

III. Board hardware implementation

Temperature sensor:

A thermistor is a type of resistor whose resistance is dependent on temperature. Thermistors are widely used as inrush current limiter, temperature sensors (NTC type typically), self-resetting overcurrent protectors, and self-regulating heating elements. The TMP103 is a digital output temperature sensor in a four-ball wafer chip-scale package (WCSP). The TMP103 is capable of reading temperatures to a resolution of 1°C.

Fig: Temperature sensor

Pulse sensor:

Attach to finger and get Analog out from the sensor based on heart beat pulse. You can read the analog output with microcontroller ADC and then plot it or calculate readings like heart beat per minute. It is simple to use and accurate results.

Fig: pulse sensor

GSM:

Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service.

The network is structured into a number of discrete sections:

- Base Station Subsystem – the base stations and their controllers explained
- Network and Switching Subsystem – the part of the network most similar to a fixed network, sometimes just called the "core network"
- GPRS Core Network – the optional part which allows packet-based Internet connections
- Operations support system (OSS) – network maintenance

SM was intended to be a secure wireless system. It has considered the user authentication using a pre-shared key and challenge-response, and over-the-air encryption. However, GSM is vulnerable to different class of attacks, each of them aiming a different part of the network.

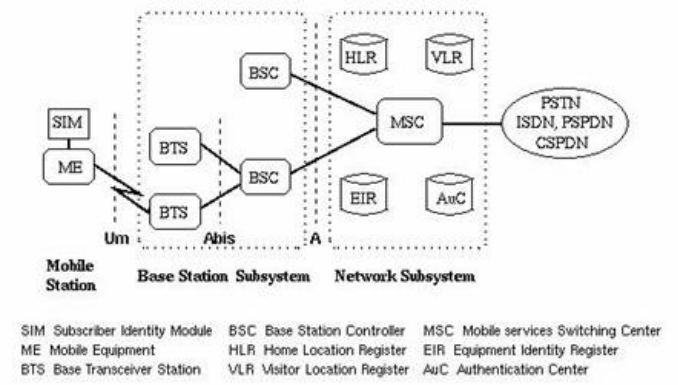

Fig: GSM architecture

DC Motor:

A DC motor relies on the facts that like magnet poles repels and unlike magnetic poles attract each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnetic field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°.

Fig: DC Motor

Motor driver:

DC motors are typically controlled by using a transistor configuration called an "H-bridge". This consists of a minimum of four mechanical or solid-state switches, such as two NPN and two PNP

transistors. One NPN and one PNP transistor are activated at a time. Both NPN and PNP transistors can be activated to cause a short across the motor terminals, which can be useful for slowing down the motor from the back EMF it creates. H-bridge. Sometimes called a "full bridge" the H-bridge is so named because it has four switching elements at the "corners" of the H and the motor forms the cross bar. The switches are turned on in pairs, either high left and lower right, or lower left and high right, but never both switches on the same "side" of the bridge. If both switches on one side of a bridge are turned on it creates a short circuit between the battery plus and battery minus terminals. If the bridge is sufficiently powerful it will absorb that load and your batteries will simply drain quickly. Usually however the switches in question melt.

High Side Left	High Side Right	Low Side Left	Low Side Right	Quadrant Description
On	Off	Off	On	Forward Running
Off	On	On	Off	Backward Running
On	On	Off	Off	Braking
Off	Off	On	On	Braking

Table: operation of H-Bridge

Buzzer:

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave ovens, & game shows. The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep.

The "Piezoelectric sound components" introduced herein operate on an innovative principle utilizing natural oscillation of piezoelectric ceramics. These buzzers are offered in lightweight compact sizes from the smallest diameter of 12mm to large Piezo electric sounders. Today, piezoelectric sound components are used in many ways such as home appliances, OA equipment, audio equipment telephones, etc. And they are applied widely, for example, in alarms, speakers, telephone ringers, receivers, transmitters, beep sounds, etc.

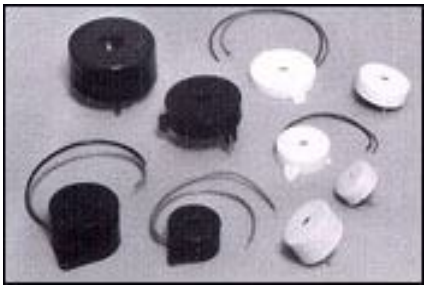

FIG: Types of Buzzers

Max 232:

MAX232 converts from RS232 voltage levels to TTL voltage levels, and vice versa. One advantage of the MAX232 chip is that it uses a +5V power source which, is the same as the source voltage for the 8051. In the other words, with a single +5V power supply we can power both the 8051 and MAX232, with no need for the power supplies. The MAX232 has two

sets of line drivers for transferring and receiving data. The line drivers used for TXD are called T1 and T2, while the line drivers for RXD are designated as R1 and R2. In many applications only one of each is used.

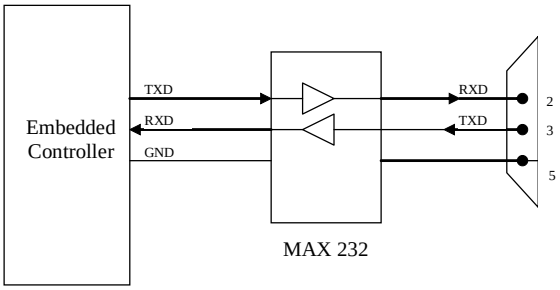

Fig: Communication through MAX 232

IV. CONCLUSION

A system to rehabilitate a heart that went through cardiac procedure was designed and tested in local labs. This proves that local talent is available and investors need to put more focus on utilizing local talents to establish technical incubators that can collaborate with international institutes or experts interested in technology transfer.

V. REFERENCES

[1]. Access to Medical Devices. [Online] 2012. http://www.who.int/medical_devices/1240EHT_final.pdf. (Last seen on Dec 2013)

[2]. http://www.badir.com.sa/en/ (Last seen on Dec 2013).

[3]. NOVEL TIME-FREQUENCY FEATURES FOR NORMAL ECG. **Nazeeh, Alothmany, et al., et al.** 3, s.l. : Journal of International Dental & Medical Research, 2012, Vol. 5, p. 179.

[4]. **Cleaveland Clinic.** After Your Cardiac Cathe terization. [Online] 2010. http:// my. clevelandclinic .org/heart/homerecovery/inter ventional-procedure / after-your-cardiaccatheterization.aspx. (Last seen on Dec 2013)

[5].**American Heart Association.** Cardiac Rehabilitation and Secondary Prevention of Coronary Heart Disease. [Online] 2005.http:// circ. Ahajournals .org/content/111/3/369.full.pdf+html. (Last seen on Dec 2013)