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Real Time Fault Finding and Monitoring Of Medical Instrument Status and Broadcasting Using GSM Technique

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Abstract: Biomedical devices play an important role in the process of diagnosing the diseases and helpful for better and appropriate treatment to the patients by the Medical Professionals. The 21st century is rightfully called the Biological and biomedical device century. More technological breakthroughs in the medical and industrial spheres are expected with heavily funded research programs underway in most of the countries in the world. Development in the field of biomedical engineering research to innovation more medical devices, have led to critical changes in many industrial segments and strengthened the medical engineering occupation. Although the conventional areas of engineering and other technology innovations will extend, more new openings will arise in biomedical engineering and in the fields of biology, medicine, health and medical equipments. However clinics, nursing homes, hospitals, medical colleges, medical research institutes and multi super specialty hospitals are in the need of emergency service for their equipments, in this aspect our project is going on. The aim of this work is to design microcontroller based Real-time fault finding and monitoring of medical equipment status and broadcasting the SMS using GSM technique, to the biomedical engineer or company field service engineer and biomedical department.
Key words: Biomedical Engineer, Medical Instrument, Real-time, SMS, GSM.

I. INTRODUCTION

Technical support may be bear by various technologies depending on the circumstance. For example direct questions can be asked by customers using E-mail, Fax, telephone calls, mobile phone, mobile SMS, chat in online and support forums; simple software problems can be discussed over the telephone or increasingly, by applying remote access repair services; while more complicated problems with hardware may need to be taken action with respect engineer. To identify the problems or tracking the fault of the objects (Medical Equipments) and the problem will be SMS to the concern biomedical engineer and biomedical deportment. The problems will be occurred in an accessories or other contained inner side of the equipment like fuse's, relays, power supply, SMPS (Switched-Mode Power Supply), power storage devices, battery, PCB, accessories.. etc.

II. METHOD OF OPERATION

Aim of this project is without making the delay, to provide the servicing to the all types of medical equipments. When the problems occur, immediately SMS will be sending to concern biomedical engineer or company service engineer (field service engineer) and biomedical deportment using GSM technique. The SMS message will contain the hospital name and address, deportment of the hospital where the equipment is placed, equipment name, equipment serial number or ID number and which fault was occurred. For Example when the heater in warmer is fault, immediately send the SMS (Short Message Service) – Hospital Name- XXX (P) Ltd, Place-Tirupur, Department- NICU (Neonatal Intensive Care Unit), Equipment Name-Baby Incubator, Equipment ID No-2014Feb, Fault-overhead warmer heater failed. Receiving the SMS to the engineer, he will attend the service with out any delay and carrying the specific spares. Same time the problem is rectified by customer means the replay SMS will be send by the same way. For example the ECG (Electro Cardio Gram) patient cable is not connecting with the patient properly when the ECG is taken; the SMS will send the engineer. Same way the engineer will give the replay, please connect the patient cable properly.

III. DESIGN METHODOLOGY

A. Intelligent GSM control unit

This is a GSM based control unit which can be used to control any inputs and outputs (I/O) based machine. It uses all the features offered by GSM, i.e. Call & Data, SMS, to accept authority as well as give critical return of information about the product.

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The equipment can be controlled via SMS, voice calls and necessary output can be given from the unit. It accepts both digital as well as analog inputs and can be programmed to give auto voice and SMS feedback when it need. For additional application can be done far away in place logging essential data set aside for a particular web server, all through the same unit.

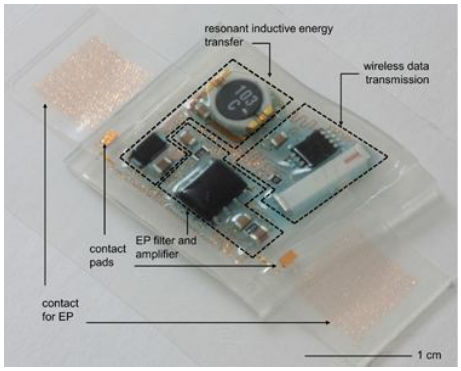

Fig 1. Stretchable circuits deliver mobile health care equipment monitoring

It supports inbuilt Voice storage as well as DTMF detection. The efficient on-board power managing system ensures power consumption is optimum and the highly advanced battery management system provides battery backup to ensure the system never goes down. In all, this is a influence arrangement to exploit the features and uses of GSM technology and give maximum output to the clients system. Stretchable circuits deliver mobile health care equipment monitoring shown in figure 1.

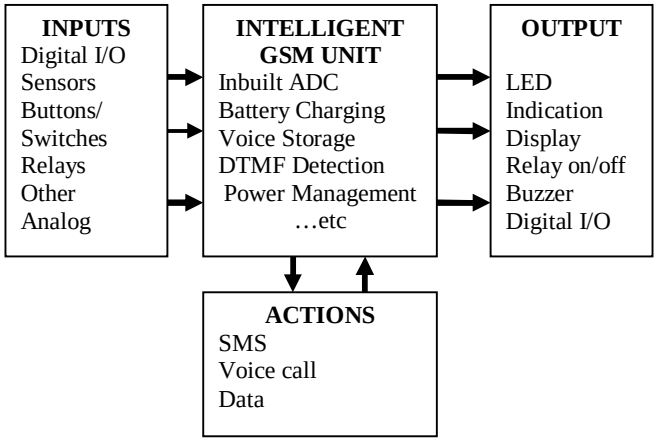

Fig 2. Intelligent GSM control unit

B. Features

Auto Voice & SMS Feedback
Inbuilt Power sources
(Battery management & battery back up)
GSM: Dual band/Quad band
In-built Voice storage
DTMF Functionality
Auto Power-off detection
Analog Inputs: Relays, Current Transformer, Sensors, etc.
Input Voltage: 6V – 30V

C. Inputs

This circuit assembles for baby incubator shown in figure 3. Here different inputs are connected to the intelligent GSM unit. In this Digital Inputs note that output of CCTV (Closed Circuit Television), sensors note that light sensors, heater sensor, door sensor etc. Buttons are temperature setting, time setting for heater, Switches note on/off the equipment, Relay is in circuit and some other analog inputs are also connected.

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Fig 3. Baby Incubator

D. Output

In output unit LED indication is note that when there is any problem is in equipment side and also displays shows that what type of problem is there. Relay on/off is using to reset the equipment and some applications. Buzzer gives the sound when the equipment is in problem. Digital I/O is using to interface with other systems (computer).

IV. ACTION

Sending SMS (Short Message Service), sending voice call for some application and giving solution for the problem to engineer that is Data application. figure 3 shows that broadcasting using GSM technique.

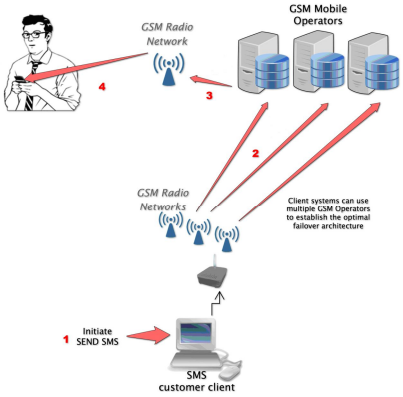

Fig 4. Broadcasting using GSM technique

V. CONCLUSION

Real time Fault Finding and Monitoring of Medical Equipment Status and Broadcasting Using GSM Technique make the operation easy, time save for customer and engineer, service cost will be reduce ,it make the system user friendly one. This project is under developing for more additional facilities like multiple medical equipments will be connect with PC some application replay via PC.

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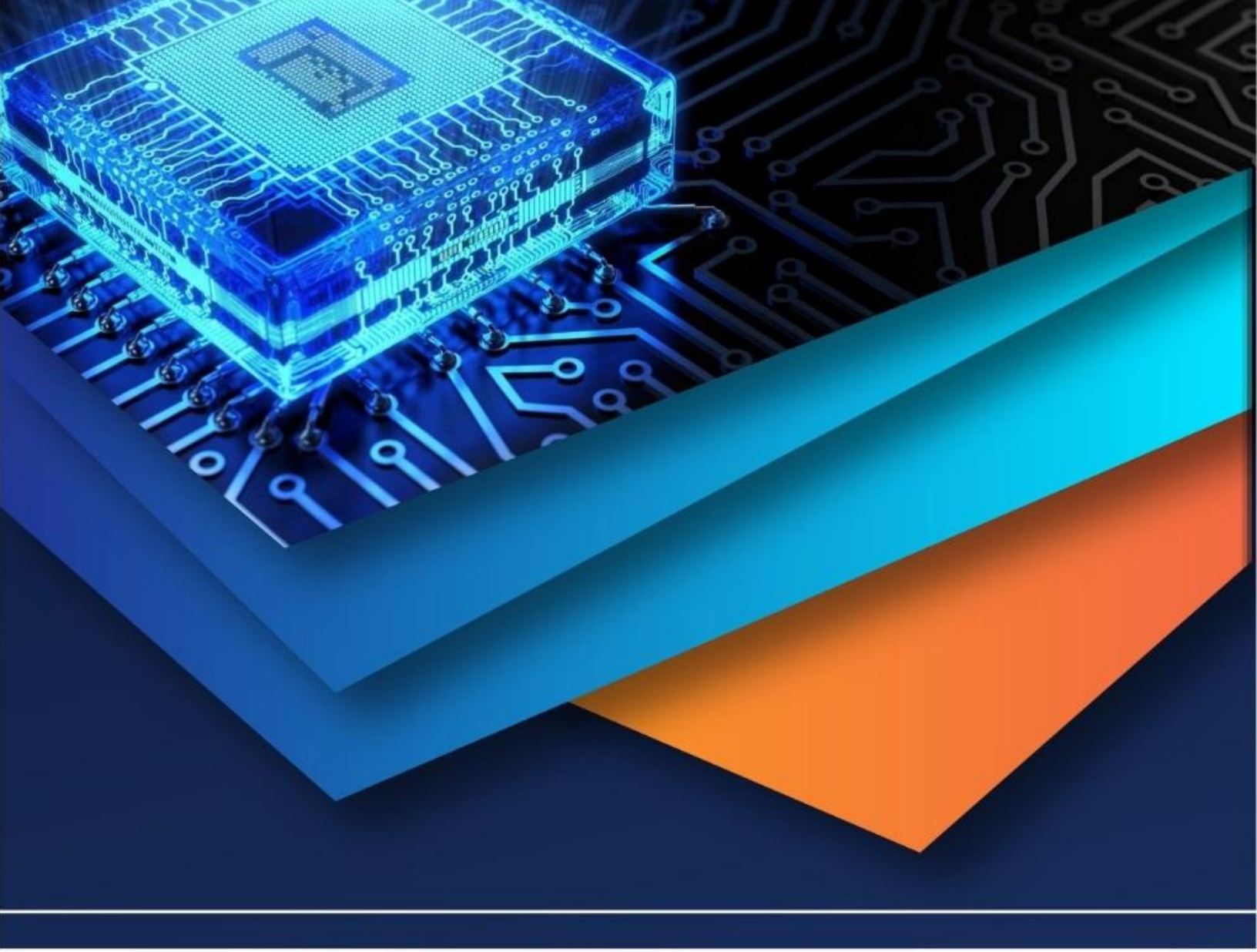

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