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Continuous Monitoring Of Critical Patients Using Sensor Data Mining Technique

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ABSTRACT
The Healthcare system can benefit medical users by providing high-quality pervasive healthcare monitoring, the growing of Healthcare system still strangest on how users fully understand and manage the challenges facing in this Healthcare system , especially on during a medical emergency. In which a new secure and privacy-preserving opportunistic computing framework, called SPOC, is used to address this challenge. With the help of proposed SPOC framework, each medical user who is in emergency can achieve the user-centric privacy access control to allow only those qualified helpers to participate in the opportunistic computing to balance the high-reliability of PHI process and minimizing PHI privacy disclosure in Health care emergency. In SPOC framework critical patients are continuously monitored, which is based on body sensor networks (BSNs) and sensor data mining technique, and allows a medical user to decide who can participate in the opportunistic computing to assist in processing PHI data.
Index Terms: Body sensor network, Healthcare system, Knowledge Discovery, Sensor Data Mining.

I. INTRODUCTION

This paper describes a model-based system designed to discover patient's sensitive value in a hospital occupied by a number of persons through sensors. The sensors used are small in size to facilitate embedding. The increasing advances in hardware technology for sensor processing has resulted in greater access and availability of sensor data from a wide variety of applications. This has lead to a need for methods for efficient sensor data processing. In which it will use sensor data mining technology to measure various values of each individual patients. It uses body sensor network (BSN) to sense and collect patient's value where it will use different sensors like temperature sensor, blood pressure sensor, heart beat sensor (IR Sensor), MEMS sensor. Micro-Controller based arduino kit is used for building digital devices and sensors that can sense patient's value.

Arduino kit connects different sensor and collect sensed values and send it into the LCD and storage card. Alarm is attached to the circuit board and which will produce beep sound for each time of sensing. Components used in this process are

- Arduino Controller
- Temperature sensor
- Blood Pressure sensor
- MEMS sensor
- Heart beat sensor
- LCD display
- Storage card

An Arduino board historically consists of an Atmel 8-16-or32-bit AVR microcontroller with complementary components that facilitate programming and incorporation into other circuits. The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila, Duemilanove, and current Uno provide 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs, which can also be used as six digital I/O pins. In which sensor input pins are connected to arduino digital and analog pins that are merged with LCD and Storage card connection.

II. METHODOLOGY

Sensor data mining technology is used to process patient's records. In which various sensors are used to gather respective parameter of each patient. Sensors are fundamental elements of all machines that gather

data, require feedback for their operation or are required to provide a Human Machine Interface (HMI). Purpose-specific sensors that are observable by instruments have been developed to enhance the scope and range of measurements. Electronic sensors based on semiconductor devices have been integrated with computers and communications networks to provide useful information-gathering solutions. Technological developments in materials and electronics have led to the integration of sensors into intelligent devices and systems that not only measure and analyse but also act on the resultant information. Intelligent sensors can also consolidate observations, and aggregate and analyse data locally to conserve downstream communications and analysis resources. Today, autonomous and connected sensors are able to selectively sample and measure many physical properties such as temperature, blood pressure. An integrated device may measure temperature, send digitized observations to a central point for analysis. Major components will be interconnected with circuit board.

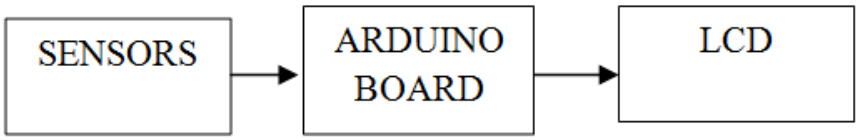

Fig 2.1 Working Method

III. ARCHITECTURE-WORKING OF PROPOSED SOLUTION

System architecture contains various sensors to measure patient's temperature, blood pressure and heart beat rate. These sensed values are analyzed in arduino board and it will be displayed in LCD. Storage card is used to gather values from circuit board for further processing of data.

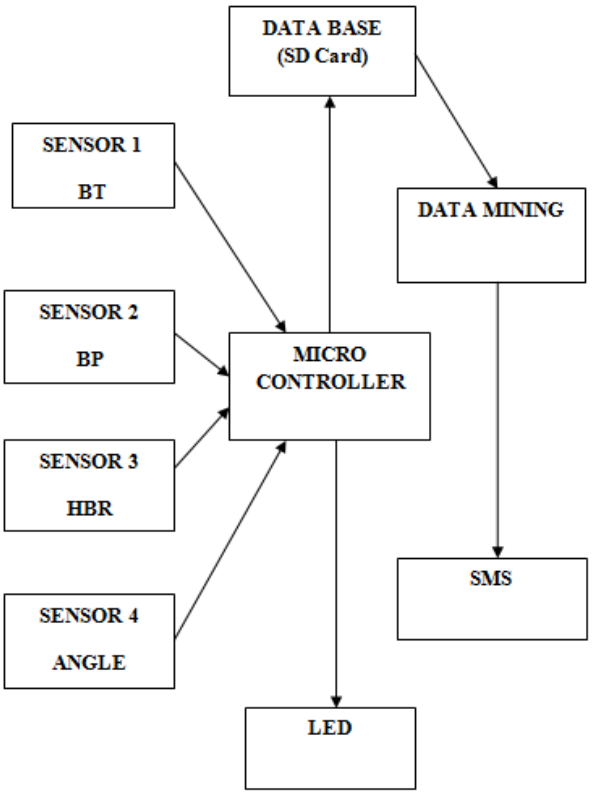

Fig 3.1 Block Diagram

In which sensors are used to measure following parameters:
BT- Body Temperature
BP- Blood Pressure
HBR- Heart Beat Rate
MEMS- Direction (Angle Value)

After Measuring these values it is send to the arduino circuit board for analysis purpose where it will check the threshold value for identifying abnormal condition. These analyzed values are sent to the LCD and Storage card. SPOC allows qualified helpers to participate in the opportunistic computing to balance the high-reliability of PHI.

IV. BODY SENSOR NETWORK

I. Lm35 Temperature Sensor

The LM35 series are precision integrated circuit LM35 temperature sensors, whose output voltage is linearly proportional to the temperature in Celsius (Centigrade). The LM35 sensor thus has an advantage over linear temperature sensors, calibrated in °Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling. The LM35 sensor does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to read out or control circuitry especially easy. As it draws only 60 μA from its supply, it has very low self-heating, less than 0.1°C in still air.

Fig 4.1 Temperature Sensor

II. Blood Pressure Sensor

Blood pressure sensor is a device that measures the pressure of the blood in the arteries as it is pumped around the body by the heart. When our heart beats, it contracts and pushes blood through the arteries to the rest of our body. This force creates pressure on the arteries. Blood pressure is recorded as two numbers - the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats). It's default normal pressure value ranges between 80 to 120. Depends upon ranges it will categorize as low, medium, high pressure.

Fig 4.2 Pressure Sensor

III. Heart Beat Sensor

Heart beat is measured by using IR sensor. There is a cavity for measurement of the heartbeat, which consist of a arrangement of LED and LDR. By placing your finger in between a LED and LDR, we can detect the pulses of heart, the analog voltages are further processed with arduino controller.

Fig 4.3 Heart beat Sensor

V. EXPERIMENTAL RESULTS

In which initially +5v input value is given as power supply to the circuit board. When the circuit kit is initiated it will sense respective parameter value by using sensors.

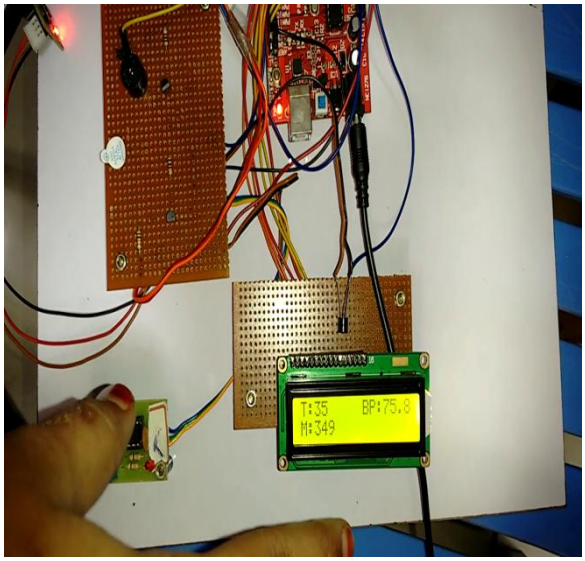

Fig 5.1 Values of LCD before measuring.

The BP value is varied after measuring with individual patient. This range is compared with default values in blood pressure sensor.

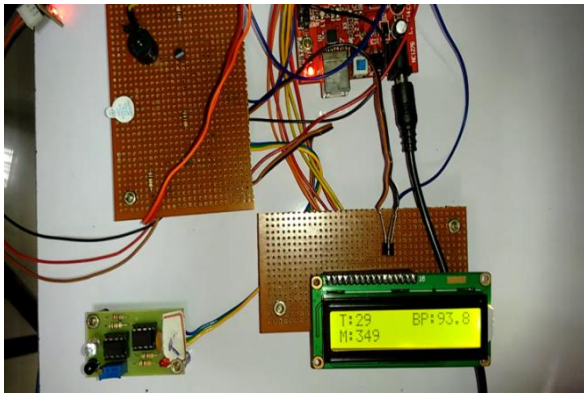

Fig 5.2 Values of LCD after measuring.

VI. CONCLUSION AND FUTURE WORK:

This health care system uses various types of sensors to extract patient's sensitive parameter value and provide rich observations of physical objects. Event based processing of sensor data enables tracking and monitoring of physical objects and semantically interpreting complex event patterns.

In the future, data mining algorithm will be used to process collected sensor values. Storage card contains sensed values of each individual patient's that is given as input to further research work. Naive Bayesian algorithm is selected to apply mining process with sensor data. Support and confidence for particular disease will be analyzed using mining algorithm.

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