Design and Implementation of Smart Hospital Bed

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Abstract— In today's fast world with an expanding life expectancy with continuous rising different disorders to people, it is almost impossible for people to stay at home or become available for their near ones who might need them while they are suffering from any disease or physical disability; especially in case of operated patients (post-operative) since they can develop complications once they get discharged from the hospital as cardiac problems may re-occur when they start doing routine work. Hence, it is a prime requirement for the post-operative patients and elderly people to monitor their health frequently whether they are indoors or outdoors so that emergency treatment can be made possible. The average age of human population has increased and coronary heart diseases have been located in the first rows of death reasons as every year nearly seven million people dies due to the heart diseases. Subsequently, monitoring of heart's electrical activities gained more importance. There are several smart home monitoring systems to support physical activities, technologies for detection of heart attack, fall prevention, and system to convey information to doctor or care giver. Thus telemedicine based system is widely considered for a key research area in our inevitable future.

Index Terms— WiFi, VB Based Graphs, Bio Medical Sensor; Accelerometer

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I. INTRODUCTION

Generally, a hospital beds with monitoring capabilities are more complex and cost is very much putting them beyond the reach of most of hospital and patient. Modifying this type of costly beds and the invasive monitoring devices could provide a much better experience for patients and ease the burden on hospital staff responsible for managing these complicated beds and devices. The hospital beds used for their treatment are not so user friendly compare to the type of monitoring and facility necessary for their healthcare of patient .busy surrounding and daily check-up routines in the hospital affects patient privacy. It affects mentally to a patient when they see adjacent patient's condition and the environment. The monitoring system is manual and thus requires time to time checkups. So the problems can be categorized into two major areas mainly privacy of the patient and monitoring system. It is very much important to provide better environment to patient, monitor patient sleep to analyze sleeping patterns and sleeping timing.

At the same time it is also required to monitor problems like seizures and sever cough in addition with passively keep track of sleep, resting patterns of body. If patient does not get attention in time by caretakers, they may cause a death so with the help of smart bed it is possible to provide solution to critical health-monitoring problems associated with bed-bound patient. Intelligent bed sensors will eliminate the need of the cuffs and wires normally associated with patient body. Care givers/staff are no longer burdened by the constant preparation to attach devices to patient's body and watch on patient activity. Care givers can receive timely alerts at the nurse's station anywhere in the hospital regarding signal trends, body movement, and bed presence. Since most health monitoring occurs while a person is in bed so smart bed is the ideal platform for improving health and better care.
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II. OBJECTIVE

- Designing A hardware using sensors and microcontroller kit
- Sensing a requirement of patients and updating our tool likewise
- Development of VB based mobile application for providing real time alerts to the end user.

III. MOTIVATIONS

The Use of Smart Automotive Hospital bed will motivate to post Operative people or elderly people for living life more comfortably. On the other hand, development of information technology in the health care system including application of Wireless sensor networks (WSNs) has lead to easy and quick service providing.

Identification and Implementation of this technology will be a step towards mechanization of traditional procedure in providing care for hospitalized patients and disable people. It can eliminate the expense of bedsore in the intensive care unit (ICU) department in the hospital and save much expense there.

IV. LITERATURE SURVEY

Smart Transfer Patient Bed is designed to solve the nurses' problems in transferring patient. The aim of the product is to assist the nurse to transfer the patient from the warded bed to the medical bed so that the nurse can bring the patient to another location. The main concept of this product is to move the patient slowly and smoothly.[3]

A feasibility study where small wireless devices are used to classify some typical user's positions in the bed have been Presented. Wireless and wearable and low cost commercial Transformer and receiver Operating at 2.3 GHz are supposed to be widely deployed in indoor settings and people bodies in tomorrow pervasive computing environment.[2]
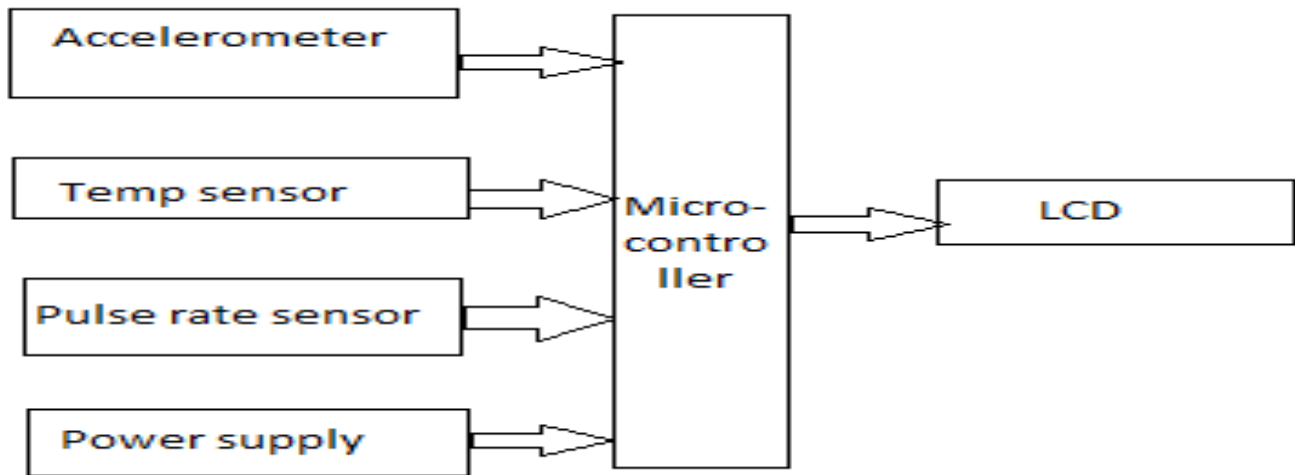

Figure 1: General block schematic of proposed system

HARDWARE DESIGN

V. KEY FEATURES

The design was divided into three parts: the top frame, the lower frame and the moving platform. Hardware design consist of

ACCELEROMETR CONNECTOR

An accelerometer is a device that measures the vibration, acceleration of motion of a structure. It is an electromechanical device which will measure acceleration forces .The force which caused by vibration or a change in motion (movement) causes the mass to "squeeze" the piezoelectric material which produces an electrical charge that is proportional to the force exerted upon it. Since the

charge is proportional to the force, and the mass is a constant, then the charge is also proportional to the acceleration. By sensing the amount of dynamic acceleration, we can analyze the way of device moving. Accelerometer will be used to locate the respective person on the z, y, and z axis parameters. The accelerometer will provide the location within the parliament location.

There are two different types of piezoelectric accelerometers or vibration sensors. The first type is a "high impedance charge output accelerometer". The second type of accelerometer is a "low impedance output accelerometer get stressed by accelerative forces, which will cause a voltage to be generated..

TEMPERATURE SENSOR:

Temperature sensor is used to sense the temperature. In general, a temperature sensor is a device which is designed to measure the hotness or coldness of an object. **LM35** is a precision IC temperature sensor with its output measurement unit is in °C. With LM35, the temperature will be measured more accurately than with a Thermistor. We have used a Temperature sensor called LM35. This type of temperature sensor can sense the temperature of the atmosphere around it or the temperature of any machine to which it is connected or even can give the temperature of the human body in case if used. So, irrespective of the application to which it is used, it gives the reading of the temperature. Temperature sensor whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.[4]

Temperature sensor is an analog sensor and It gives the output in the form of analog signal. This signal is feed to ADC which will convert it into digital form. Once the signal is converted into analog form, the microcontroller can process the digital temperature signal as per the application

VI. FIGURES AND TABLES

Accelerometer	Direction	Result
Accelerometer 1	A_1x-	Bed Left
	A_1x+	Bed Right
	A_1y+	Bed UP
	A_1y-	Bed Down
Accelerometer 2	A_2x-	Light On
	A_2x+	Fan On

Table 1: Results with respective of Accelerometer direction

VII. CONCLUSION

This paper has presented design and implementation of Smart Bed which will be useful for the hospitalized patients. Design is done with Embedded C, Microcontroller, wireless communication with the software (VB) for showing the graphs & tables and serial communication between different sensors and processor. In this proposed work we are going to analyze the health condition of patient and we will try to help that patient to recover early without staying dependant on their relatives.

VIII. ACKNOWLEDGMENT

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