An IoT based Smart Medical System in Trains for Passengers

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ABSTRACT- *Among different modes of transportation, railway transportation offers excellent energy conservation, environmental protection and reduced travel time. Invariably, this mode of transportation plays a major role not only in the transportation of goods, but also of passengers. Even many technological developements arise in the field of railways: healthcare is still not in concern. This paper proposes a controller based technique to give first aid support to the emergency patient and the details will be transferred to the loco pilot by implementing this technique to save the life of emergency patient in travel.*

KEYWORDS: IOT, Microcontroller, Heartbeat Sensor, Respiratory Sensor, Ventilator Mechanism, CPR Mechanism, Arduino.

I. INTRODUCTION

Health is one of the global challenges for humanity. In the last decade the healthcare has drawn considerable amount of attention. The prime goal was to develop a reliable patient monitoring system so that the healthcare professionals can monitor the patients, who are either hospitalized or executing their normal daily life activities. Recently, the patient monitoring systems is one of the major advancements because of its improved technology. Currently, there is need for a modernized approach. In the traditional approach the healthcare professionals play the major role. They need to visit the patient's ward for necessary diagnosis and advising. There are two basic problems associated with this approach.
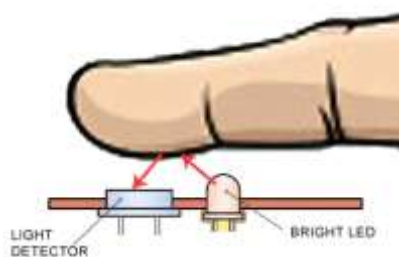

Fig.1. Heartbeat Sensor

Fig.2. Respiration Sensor

Firstly, the healthcare professionals must be present on site of the patient all the time and secondly, the patient remains admitted in a hospital, bedside biomedical instruments, for a period of time. In order to solve these two problems, the patients are given knowledge and information about disease diagnosis and prevention. Secondly, a reliable and readily available patient monitoring system (PMS) is required. In order to improve the above condition, we can make use of technology in a smarter way.

II METHODOLOGY

In our project, we designed IOT based smart medical system for patients who travel in train. This system is designed for emergency cases. The system is based on ventilator mechanism and CPR mechanism. It has two sections namely, engine section and compartment section. Compartment system performs signal acquisition and detection of abnormalities, it has IOT module to transfer patient data to engine section. Engine section is used as an alert system.
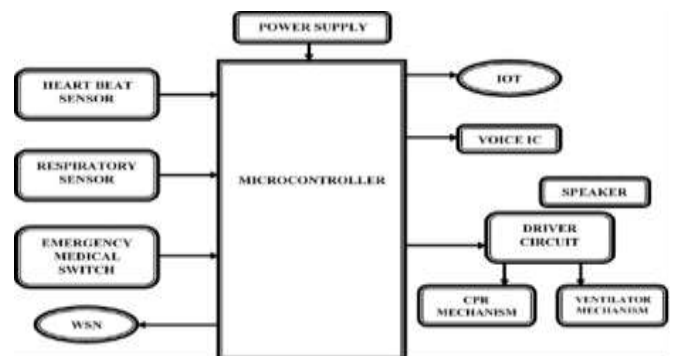
A. COMPARTMENT SECTION:

Fig.3. Compartment Section

1. Power Supply

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

2. Microcontroller

These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for

loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.

3. Wireless Sensor Network

A Wireless Sensor Network (WSN) is by hundreds of small, low-cost nodes that are fitted with limitations in memory, energy, and processing capacity. . Network setups can be carried out without fixed infrastructure. Suitable for the non-reachable places such as over the sea, mountains, rural areas or deep forests. Flexible if there is random situation when additional workstation is needed.Implementation pricing is cheap. It avoids plenty of wiring.It might accommodate new devices at any time.It's flexible to undergo physical partitions. It can be accessed by using a centralized monitor.

4. IOT module

In this module physical things embedded with electronics, software, sensors, and connectivity enabling data exchange. Basically, a little networked computer is attached to a thing, allowing information exchange to and from that thing.

5. Heart beat Sensor

Heart beat sensor is designed to give digital output of heat beat when a finger is placed on the sensor.

6. Driver circuit

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays These devices will handle numerous interface needs particularly those beyond the capabilities of standard logic buffers.
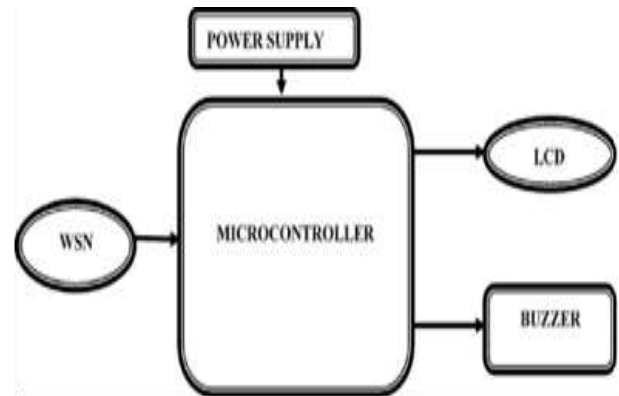
B. ENGINE SECTION:

Fig.4.Engine Section

1. LCD

LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. LCDs supporting more than 80 characters make use of 2 HD4478 controllers

2. Buzzer

In this buzzer is used as alarm system to notify the loco piolet.

III PROPOSED SYSTEM

In proposed system, two different sections namely compartment and pilot sections. In the compartment section, when an emergency situation occurs then there will first aid set available in the compartments. While turning on the setup, it able to monitor the heartbeat and respiratory level of the patients through respective sensors. If any value goes beyond threshold value then the controller will give assistive support by pre recorded Voice from the voice IC. When the respiratory level comes down then the controller will give command to turn on the ventilator mechanism to give breath support to the patient. Likewise when the heartbeat range goes down then the controller will activate the CPR mechanism. During this state the emergency message will be sent to the loco pilot through WSN module. In addition to that patient health status will be uploaded in the web server through IOT module.

IV RESULTS AND DISCUSSIONS

In the existing system, there is no new technique had been implemented till now to help the emergency patients in the train travel. Till now emergency wire pulling method is used to stop the train for emergency. But, by stopping train will increase the time to reach to the hospital. It will result in delay in process. Thus an automated electronic system for medical emergency condition during train travel is successfully achieved. This system provides preliminary

medical support for patients before reaching railway station for providing further medical treatment.

V ACKNOWLEDGEMENT

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