

# E Health Monitoring Systems in Smart Environments

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## Abstract

In modern decades, E Health monitoring systems have been evolved quickly to become a feasible substitute for monitoring the patients in smart environments. The foremost aspire of E Health monitoring systems is to afford well-timed E health services which satisfy the perspective and genuine requirements of patients. The monitoring systems capture and broadcast the significant sign parameters of heart beat, blood pressure and body temperature. The overall performance of a service are measured or described by the Quality of Service. In this paper we propose a novel network model of E\_Health monitoring to improve the Quality of Service. To characterize the realistic system performance a set of numerical value are presented in proposed schemes.

**Keywords:** E\_Health monitoring, smart environments, sensors

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## I. INTRODUCTION

E Health monitoring system plays a vital role in today's modern world. To maintain the functioning conditions on the systems, the monitoring systems performs a series of operations like monitoring current state of the system s based on the observation, managing the system physical condition and plan the suitable preservation and restore operations. E Health monitoring systems incorporate diverse sensors and devices for the purpose of gathering data and generate the awareness for the end-users. This awareness can be able to use for dissimilar suggestion or supplementary information in case of needs. The wearable health monitoring systems is a nonstop real-time monitoring system during a long phase and the sensor is worn on the human body using clothing or accessories. These sensors can transport the health data to a chosen person from a distance throughout wireless communication.

E Health monitoring the patient subject is a complex job because of intricacy of various day by day performances and the performance changes from one patient to other patient. Also this performance changes can happen even for similar patient depends on their frame of mind, atmosphere and health circumstances.

In E Health monitoring system, Quality of service (QoS) is the best effort and servicing technologies [1]. Quality of Service can be defined as the entire performance of the service which further determines the degree of satisfaction of the user who uses it. These can be tele-diagnosis, tele-management, tele-consultation etc. The telemedicine technologies are used to monitor the patient details in periodic intervals.

The E Health applications appeared for the incessant monitoring of patient activities which collect and transmit the essential sign parameters such as temperature, blood pressure, oxygen level, blood glucose levels and heart beat. These parameters are usually used for further evaluation and interaction in cases where abnormal conditions are detected. Hence, the system allows healthcare providers to monitor the medical condition of the patient and immediately provide appropriate services. In this category of applications, most studies and

prototypes share the same functionalities and properties such as collect, capture, store and send context in terms of essential signs.

## II. RELATED WORK

Liang et al proposed wearable mobile medical monitoring systems which incorporate of physiological sensors, transmission sections, and processing facilities for nonstop medical health monitoring [2]. Haahr et al developed an Electronic Patch which includes new optical biomedical sensors, microelectronics, radio frequency communication, and a battery implanted in a 3-dimensional hydrocolloid polymer for wearable health monitoring system. The size of an Electronic patch is 88 mm by 60 mm and a thickness is about 5 mm. Also the Electronic Patch is used to measure the pulse and the oxygen saturation [3].

Teng et al presented recent development reviews of p-Health systems for wearable energy harvesting and the evaluation of wearable medical devices [4]. Pantelopoulos et al presented a survey on wearable biosensor systems for health-monitoring and offered the track for future research enhancements [5]. Omoogun et al addressed a probable key in the form a wearable wireless monitoring device to measure the temperature and pulse rate of the patient and to work together mutually over cellular network [6].

Lee et al proposed a mechanism for medical-grade quality of service (QoS) to improve the throughput performance over the conventional IEEE 802.11e MAC in real-time patient monitoring applications [7]. Abreu et al proposed a QoS based utensil for patient's healthcare monitoring applications. It detects and classifies the probable destructive variations in the quality of service; circumvent its degradation to levels; and to handle the admission of new patients to the network [8]. For continuous patient monitoring, efficient set routing algorithm with mobile sensor is proposed by Premi m.s et all [9]. Valantina, G et all presented a solution for lung cancer patient monitoring with Shape based image retrieval [10].

## III. PROPOSED SYSTEM

The system model for E Health Monitoring of patients by using different sensors is shown in figure 1.

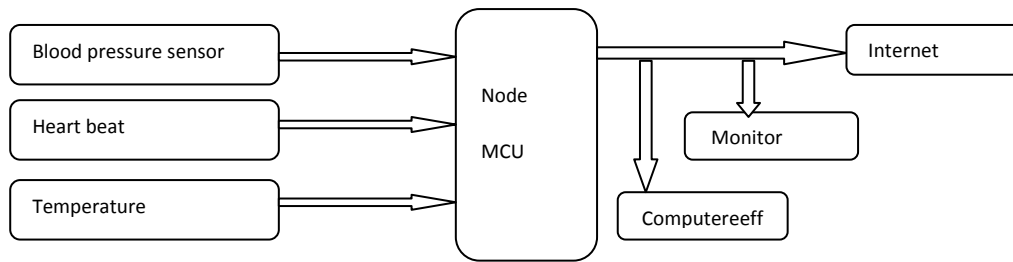


Fig 1 System model for E Health Monitoring

The components to be used as follows: Blood pressure sensor, Temperature sensor, Heart beat sensor, NODE MCU, Monitor, Internet, Computer. Blood Pressure Sensor employs an instrumented elastic cuff, wound around a blood vessel which detects the blood pressure. Temperature sensor includes a resistive element and a sense of wet NTC temperature measuring devices. It has the advantage of excellent quality, fast response and anti-interference ability performance. Node MCU is an open source IOT platform which comprises firmware which runs on the ESP8266 Wi-Fi SOC. It is 32 bit ARM microprocessor with support Wi-Fi network and built in a flash memory. Many technologies and methods have been IOT based system to achieve the patient monitoring and processing of the data. All the data will be collected from the different sensors, sending to a computer and monitoring the patient condition. The solution for data processing takes an account of data acquisition, data storage, data inquiry, and data analysis.

Blood pressure sensor is deployed on the body of the patient to monitor the blood pressure levels of the patient periodically. This method has the transmitter and receiver in the same plane. Reflective Heart beat sensor can be placed on other areas of the anatomy than the finger, such as the forehead. The patient have to touch the heart beat sensor to monitor the heart beat level of the patient and the values are shown in the monitor. Temperature also monitored for the patient and data are stored in the cloud. The experimental set up to monitor the blood pressure is shown in figure 2.

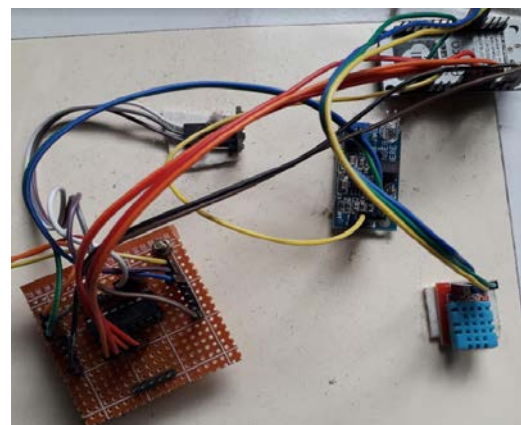


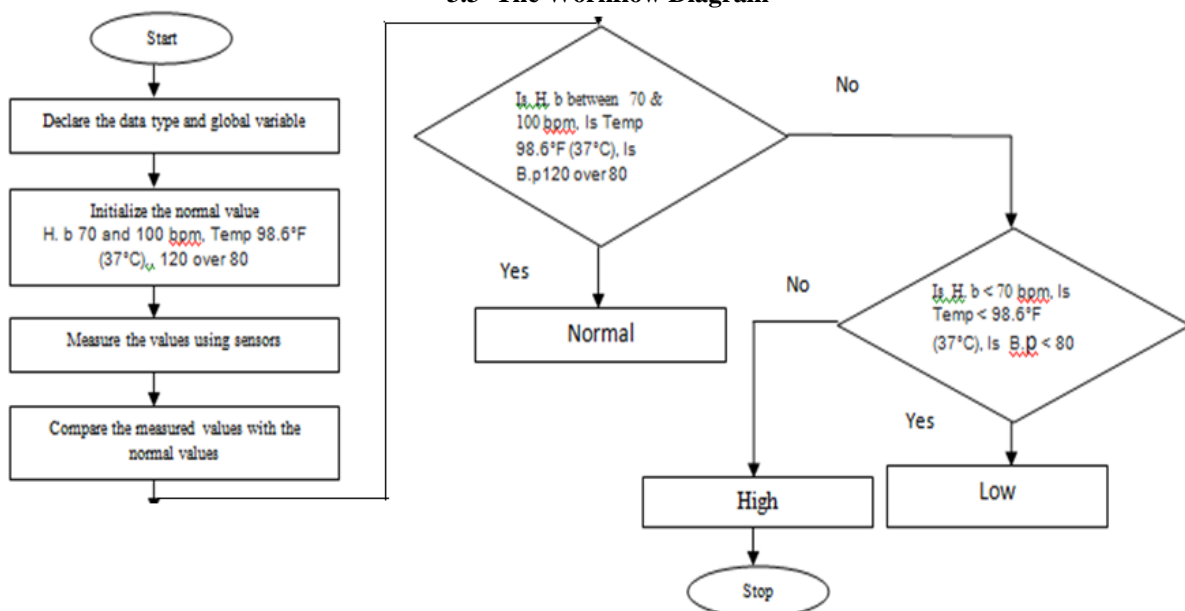
Fig 2 Experimental set up

**3.1 Network architecture**

The network system architecture is composed of three modules: (i) sensors to be statically deployed in the monitored areas; (ii) monitor the patient health details by using sensors; (iii) build a node MCU controller.

**3.2 Working Principles**

**3.3 The Workflow Diagram**



#### IV. RESULT

We have monitored 4 different patients by deploying sensors and we have taken temperature, blood pressure and heart beat values. All the patients names and details

are shown in the table 1 then the values are plotted and shown in figure 3.

Table 1 Patients names and Details

Patients	Temperature			Blood pressure			Heart beat		
	Low	Normal	High	Low	Normal	High	Low	Normal	High
Patient 1	60	90	91	85	125	164	70	80	90
Patient 2	64	90	91	80	130	160	72	82	92
Patient 3	67	89	92	82	127	167	74	84	94
Patient 4	65	89	92	70	120	170	76	87	97

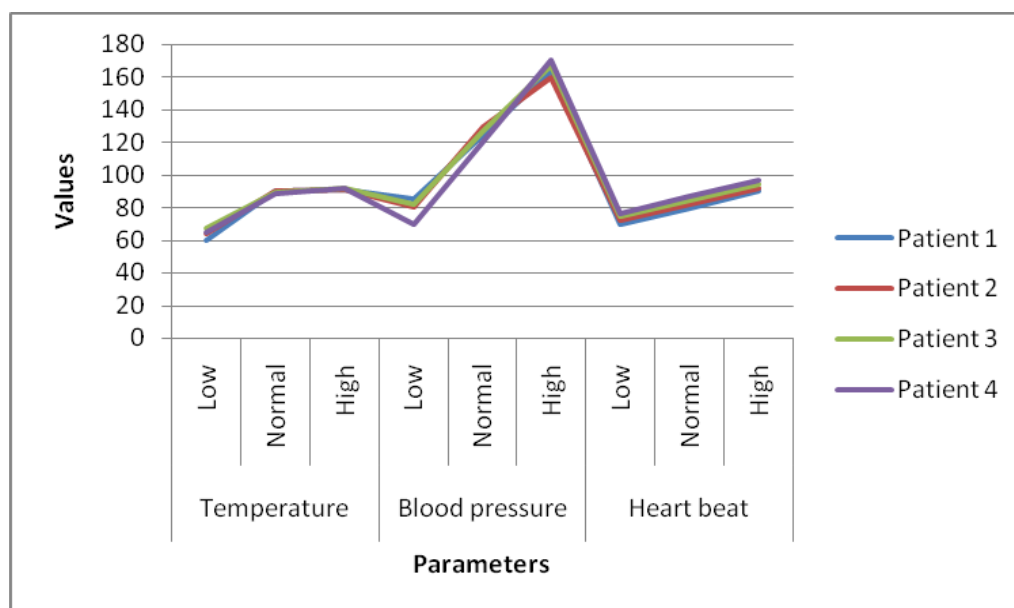


Fig 3 Experimental set up

#### V. CONCLUSION

In this paper, E Health monitoring systems for monitoring the patients in smart environments have been proposed. Particularly this monitoring system is significant for patients to be monitored in the reassurance of their residence which improve the level of medical support. These E Health systems monitor the significant sign parameters of heart beat, blood pressure and body temperature. To characterize the realistic system performance a set of numerical value are presented in proposed schemes.

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