

# ICU PATIENT MONITORING SYSTEM

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**Abstract--** *There is a strong need for integrated patient management services, because they not only decrease manpower and expenses but also rising the time spent in professional facilities. Past wired networking has been used, but now the Zigbee wireless mesh network is favoured due to cost. Owing to its energy performance, low cost and long range (several kilometres) Zigbee is often preferred for Bluetooth and wireless infrared communication. In this paper we suggested the usage of the Zigbee interface to transmit wireless data between a patient and a centralized network. The paper is split down into two parts. For certain cases the first is a nurse management program and the second is a structured control device for doctors. Such two schemes, such as Zigbee, connect through wireless communication technologies. In a number of cases we track the patient in the first segment. Several physiological parameters, such as individual patient's ECG, temperature, heart rate, were calculated by the respective instrument. When increasing physiological parameter value exceeds the threshold value, the warning signal and the LED will be activated for each patient device. This enables a doctor to interpret in real time the various physiological conditions in a case. The values for each unit of patients are seen on the LCD. Similarly, several patient-specific instruments are used to calculate certain clinical parameters, and a multi-patient tracking program is implemented. A unified patient monitoring method is implemented in the second portion, in which all parameters are shown using MATLAB for several parameters of central control. Using MATLAB tools the ECG chart is shown on the main board. The main LCD shows parameters including heart rate and body heat, too. The module is cost-effective, uses low power and has reasonable range.*

**Keywords--** *Arduino, Temperature Sensor, Zigbee, Heartbeat sensor, ECG.*

## I INTRODUCTION

The Today's global population is increasingly growing. Therefore, proper sanitation centers are required that must be well managed and built. Many patients with serious condition adopted the conventional treatment program, which was next to the patient's wire network. It isn't all about rising patient travel from one ward to another [1]. Yet it through the pressure on the patients. This therefore uses more energy, and absorbs higher fuel. This condition has inspired man to build emerging technologies, such as wireless communication made possible by mobile health systems. Low cables and simple handling render wireless data acquisition device possible [2].

Patient treatment takes place in the hospital bed, requiring many people to remain in one room. Not only is that concerning, but it also sets the framework for the health treatment system. Monitoring of patients is performed on a professional basis. There is one patient in a bed, and many physiological parameters are independently calculated

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[3-6]. The warning machine notifies the nurse and the doctor whether there is an accident. As there may be occasions where a nurse has to move from one unit to another, which may intensify the burden on the patient. When several people visit the nurse can not necessarily see the emergency situation. To the individual, it may be life-threatening. It also heightens the pressure on the doctor. A unified patient management program is then implemented to reduce burden and ease time. Centralized control of care plays an significant part in therapeutic matters [7]. In developing countries it is still not completely established. It currently has multiple physiological parameter data shown by each of the patients on the main panel the nurse saw, accompanied by the warning device. A central computer is able to track the 16-25 patient details. To establish a centralized patient monitoring network, a hospital unit may use either transfer mode to move data to the central monitor [8-10] Wireless Communication technology is introduced in this article, ZigBee. Mobile communications favor ZigBee to Bluetooth and have low energy usage in infrared, broad coverage, low expense, high availability, high network efficiency and fast latency [11]. For Bluetooth One there are only a limit of 8 nodes connected at a time, although ZigBee utilizes the wider network region [12-14]. If there are more than 40 nodes at a time, it executes several first-to - one routing algorithms.

Throughout this analysis we used wireless ZigBee communication to turn all of the patients 'physiological parameters into a central display throughout real time. For all patient details the nurse sits in a single room. Temperature, electrocardiogram (ECG), and heart rate were the physiological parameters assessed. The sensors defined in a patient module calculate certain parameters. Both patients make up the unit network, and the results from these units are moved to the hospital's main network. Find abnormalities clinically, and take necessary measures [15].

## II DETAILED DESCRIPTION

### A. BLOCK DIAGRAM

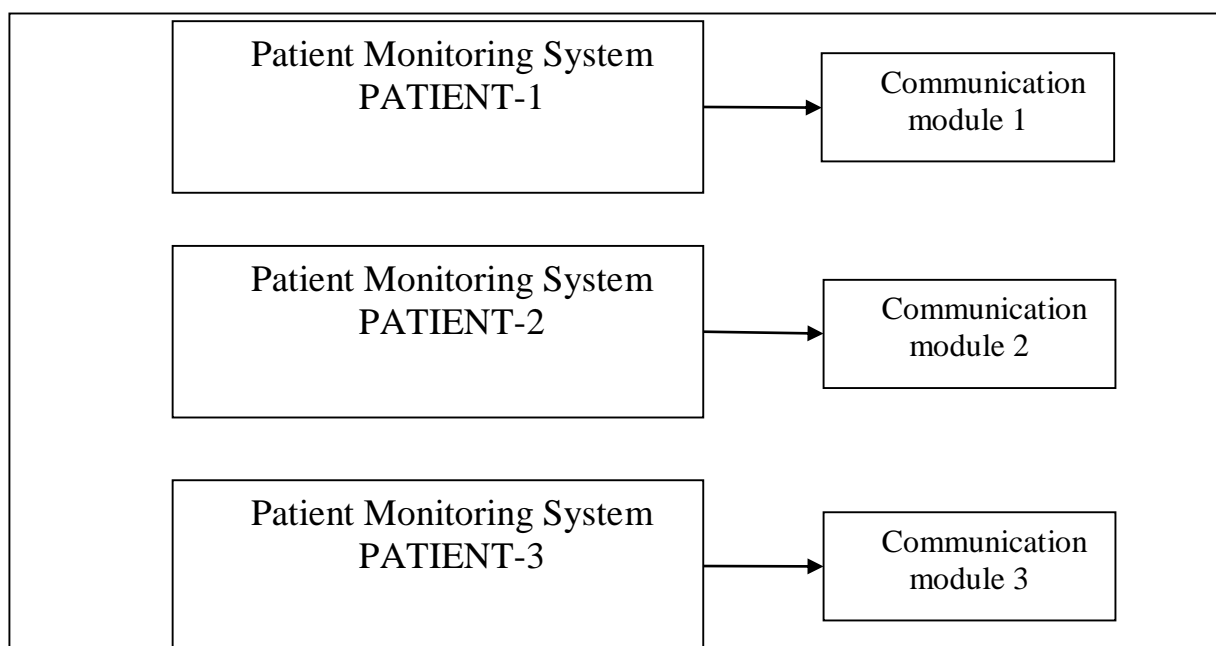


Figure 1: Block Diagram of System

This study's main objective is to establish a standardized control method for patients utilizing a wireless communication mesh network, such as ZigBee as seen in Figure 1. That figure refers to the estimation, using it, of all therapeutic criteria collected in the patient monitoring network and sent to the central controller in real time. Band frequency ZigBee ISM 2.4 kHz. Using serial communication, all N patient details are transmitted.

### III PROPOSED ALGORITHM

Separate sensors calculate and submit specific volumes to the microcontroller. The microcontroller reads and shows the LCD. On the oscilloscope the ECG diagram is seen. When the reading is above or below the threshold mark, the LCD and warning and LED should light. It refers to a patient monitoring system Patient. Likewise, other physiological parameters of N patients are determined in LCD according to different patient unit and requirements for warning and LED lighting. N Patient data is transferred to a central monitor that continuously displays all patient data at a time. Sitting on the main table in the operating bed, the nurse checks the data during every incident, the doctor tells. The warning will turn up on a central display.

### IV DESIGN OF SYSTEM

#### A. MONITORING SYSTEM

Monitoring of patients at the person level is performed in this portion. Each portion is composed of units N. Every device has its own sensors. Such sensors calculate the physiological parameters of a single individual, such as temperature, electrocardiogram and heart rate. Those measurements are read after adjustment by the microcontroller. The microcontroller can interpret and show certain readings on the LCD. Emergency buzzer and the Lead will light if the value meets or falls below the threshold value. This provides a control mechanism for patients. We took two patient data for test. The patient has ECG data seen in Figure 2, we took heart rate and temperature independently from that of the nurse. The ZigBee RF transceiver module connects the clinical parameters in Figure 3 to the patient tracking device. N modules for N devices are set to each device individually. This RF module serves as a node for transmitters and transmits their data to the main computer.

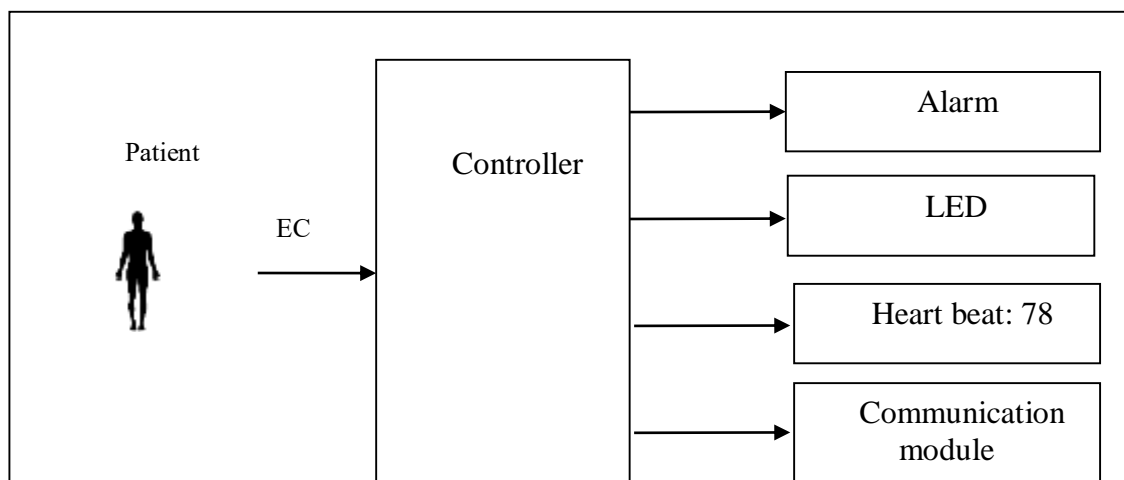


Figure 2: Patient one unit

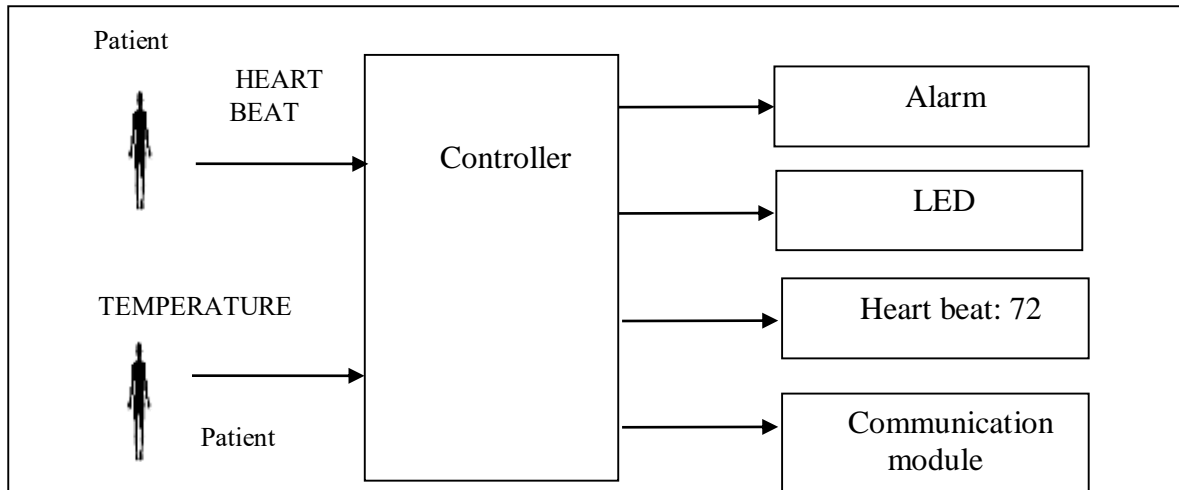


Figure 3: Second unit

### B. MONITORING SYSTEM

Inside this module in the central room are several main monitors. The main controller gathers and retains data from the patient monitoring program. The nurse takes charge of the details in case of an accident, and advises the doctor. It is illustrated in Figure 4. Use the ZigBee network the device is then distributed again. ZigBee serves as the administrator of the recipient node and continuously collects data from all patient segments. A central station announces an alert and will not generate false alerts. The data for the central display is derived from the observation of the bedside patient. Using the analog to digital converter, this information is sampled and digitized to the correct scale. The unified device enables you to track on a single display several bed-patients. Which cut back on time and energy. This is a flexibler device.

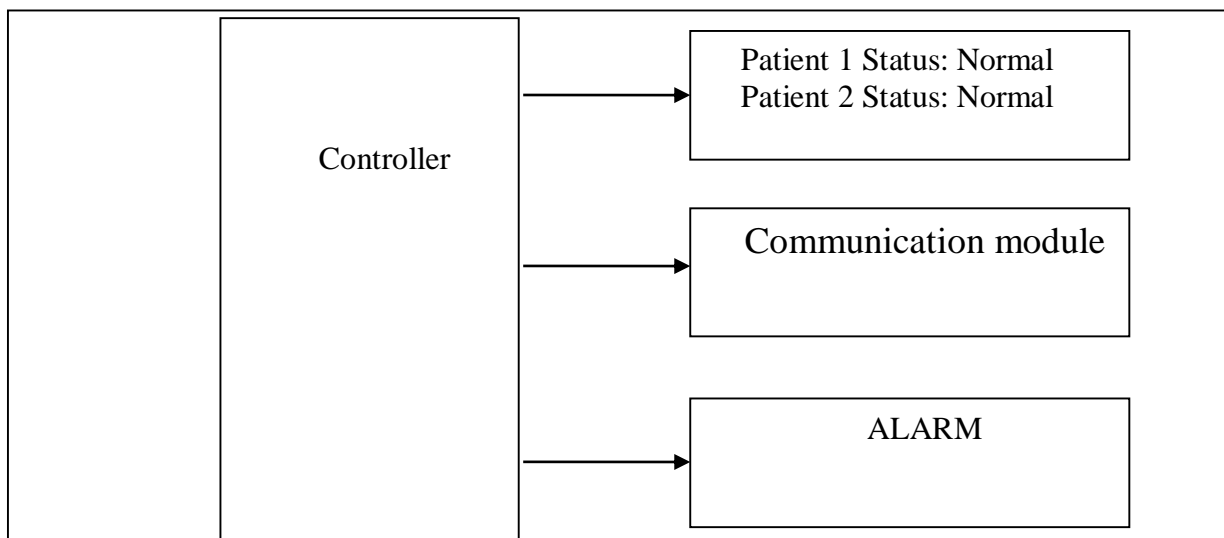


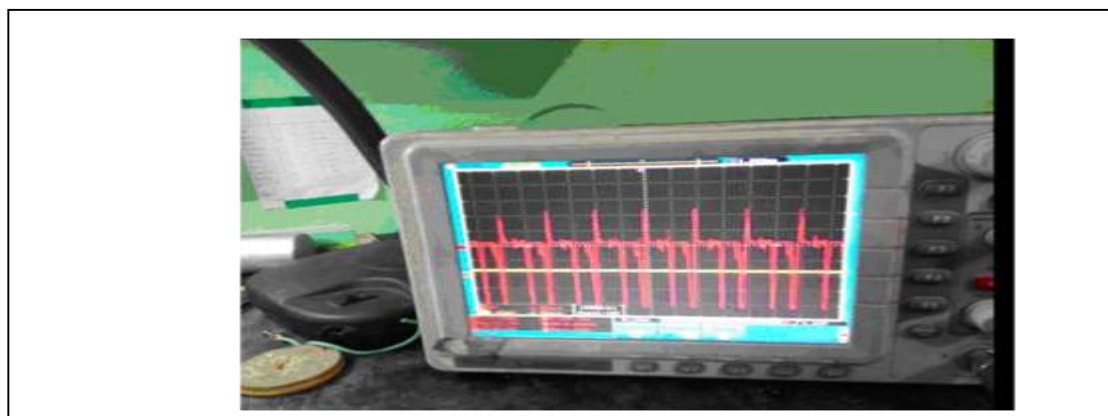
Figure 4: Central Unit

## V RESULTS AND DISCUSSION

The measures given below are ECG, pulse rate, and LM35. The ECG image is displayed on the oscilloscope for a hospital as seen on the Hospital 1 LCD in Figure 5, and as seen in Figure 6. The patient was assessed both in heart rate and temperature. Measurements of the two patients are seen on the main display. This displays main LCD readings. The threshold value for the temperature for a patient's two units is 38 degrees Centigrade which is considered natural. The temperature below 38 is small. This shows more than 38 hi temp numbers. It is considered normal if the heart rate is 65 to 100 or equal to 65 or 100 for heart rate. If it is below 65, the bradycardia number will be displayed. If it is above 100, then the number tag will be displayed as shown in Figure 7. H indicates the heart rate in the eight column, the temperature in the first row of the central monitor in the central LCD, and the temperature in the first row of T in the second row. Their T and H ratios are 37 for T and 132 for T. All data is continually evolving By ZigBee module. Take three modules of the ZigBox 2. They serve as a transceiver for RFs. Communication systems act as a transmitter or router, some as a central control routing and ZigBee device, some as a receiver or controller. The ECG model is also illustrated on the main panel using MATLAB as seen in Figure 9, and the measures of heart rate 'H' and temperature T are seen in Figure 8, respectively with values of 38 and 60



**Figure 5:** Patient one display



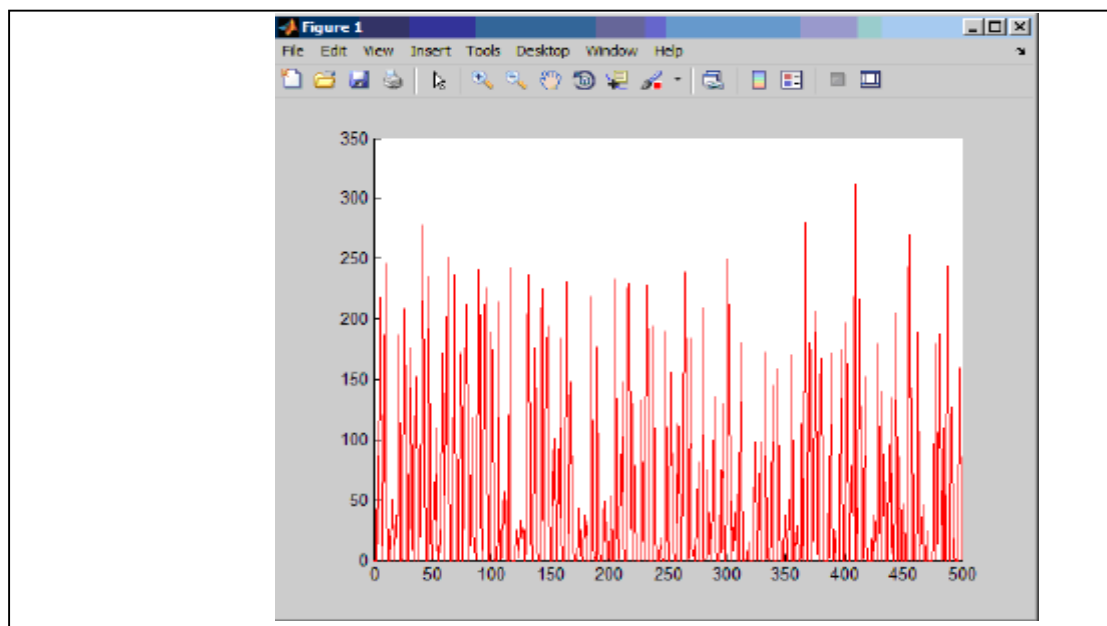
**Figure 6:** ECG Graph On Oscilloscope



**Figure 7: Patient 2 Result**



**Figure 8: Central Monitor**



**Figure 9: Central Monitor ECG Graph**

## VI CONCLUSION AND FUTURE SCOPE

Within this initiative, a centralized patient management program is successfully introduced using ZigBee technologies and the data is loaded successfully into the main display. Three physiological parameters were accurately assessed. Such sensors were developed with success utilizing the respective circuit to minimize costs and size. The module ZigBee will run up to 100 metres. For the number of patients N we may calculate the results. We use a dual delivery microcontroller in the future and get an ECG negative print waveform. Instant setup of unaffected critical sensors is also possible. In the future, blood pressure, temperature, carbon dioxide, SpO<sub>2</sub>, respiratory rate and blood PH will be calculated by constructing a different sensor circuit. You Using the Android device, you will give physicians update on the broad gui. In fact, where there is no doctor or medic in an emergency, the robot may be programmed to immediately take the appropriate steps to have a precise response. To the provider over a particular issue.

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