# Advanced Patient Health Monitoring System Using Power Line Communication Technology

**S. Sweetline Shamini ,Gayathri.M, Harshini.M, Suruthi.S**

***Abstract:*** ***Open source automation system is rapidly developing towards more reliable communication systems. In recent years for its convenient installation and low cost the power line increasingly become a popular transmission medium in creating industrial/ resident work. PLC is a technology uses power lines as physical media for data transmission. PLC offers a no new wires solution because the infrastructure has already been established. PLC modems are used for transmitting data at a rapid speed through a power line in a house, an office, a building, and a factory, etc. Due to this additional telemetry features, cost of the devices are more and all hospital or clinic cannot afford to buy them. Hence in our work, temperature, blood pressure and heart beat monitoring equipment based on power line communication is developed. This is cost effective equipment which uses existing power cables as communication medium. Power Line Modem (PLM) is used for transmitting and receiving the signals over power line cable. Signalsare modulated and demodulated using direct-sequence spread spectrum (DSSS) technology. When compared with other communication technologies like local area network (LAN), ZigBee, Bluetooth, the establishment cost for healthcare monitor using Power Line Communication (PLC) was low.***

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***Index Terms: PLC Technology, PLC modem, Energy Efficiency, ZigBee, FSK.***

## I. INTRODUCTION

This project develops a real time communication using power line as the physical medium for data transmission. The main aim of this project is to monitor the patient health using PLCC technology. The health parameters and the data extraction methods have been set up in such a way that it is given as a input signal to the PLC modem. Then the data is modulated and transmitted through the power line using PLC transmitter.

If in case, any emergency occurs while monitoring the patient the buzzer will indicate and a message intimation will automatically be sent to the doctor through GSM. The data is extracted from the receiver and displayed. This project provides effective communication between patient and medical assistant.

## II. RELATED WORKS

In hospitals, medical equipment like ECG machine, ventilators, infusion pumps, heart beat and blood pressure monitors are placed near the patients who need medical assistance. Medical Intensive Care Unit (MICU) in some hospitals has automated patient monitoring system for their patient. In some cases these automated units are interconnected by networking for central monitoring and medical data storage. Recent year's communication technologies are applied in healthcare for performing surgery and delivering assistance to the patients in the form of tele-surgery, telemedicine, biotelemetry using LAN, Radio Frequency (RF), ZigBee, WAN etc. Rural and urban sectors are targeted by the medical industries for assisting and delivering medical care.

High-speed data transfer over power grids is ensured by PLC technology supported by different worldwide standards. Realization of this technology is advantageous especially in buildings where there is no data network or other transfer medium. PLC technology can be used as an alternative way to Wi-Fi, for example, due to wall width when Wi-Fi is not usable. This technology has been often given in relation with possible usage in smart homes. Installation of modems is easy and fast. After connection of PLC modem in power supply, data are available in power grid at home or in a building.[1]

Power line communications (PLC) have become aviable solution in smart grid since most devices are connected to power lines. Although PLC stations can receive power through power lines, they also require efficient use of energy. To this end, recently published PLC standards define a power saving scheme. Since the current PLC power saving scheme only defines a simple constant sleep period strategy, two adaptive sleep period adjustment schemes are presented here. The delay performance and power consumption of the three power saving schemes are verified numerically and through simulations. The two adaptive schemes are confirmed to properly balance delay performance and power consumption for any traffic type.[2]

To improve energy efficiency (EE) in power linecommunication (PLC) systems, we proposed a dynamic load based PLC system model as a new model for EE maximization and an energy-efficient resource allocation strategy optimizing load impedance, transmission power as the optimization arguments. Since the load impedance at receiver is influenced by characteristics of a power line channel, optimizing the load impedance is required to maximally induce a received power while considering the channel characteristics. We need to

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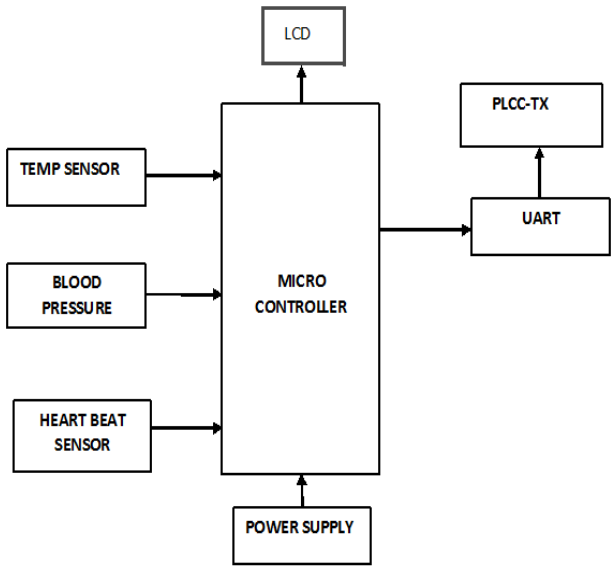
maximize network EE while satisfying constraints that transmission power of a transmitter cannot be exceeded by its maximum limit and minimum quality of service should be guaranteed.

Therefore, we studied a scenario optimizing the three arguments based on orthogonal frequency division multiplexing downlink networks with the non-white Gaussian noise channel in multi-receiver PLC systems. Using nonlinear fractional programming and Lagrange dual method, we provided a tractable solution as an iterative algorithm obtaining the optimal value of the arguments. Simulation results showed that the proposed system is more energy-efficient compared to baseline schemes, and EE is greatly improved by the synergistic effects of the impedance optimization and the sub channel allocation strategy.[3]

This paper aims to analyze the dynamic operationsof the low-voltage Grid. The sample system is composed of a low-voltage grid, three-phase PI section line, three-phase transformer as well as a load. In the Smart Grids, data transmission of various distributed energy resources and its communication infrastructure are put together in order to better control the system. Therefore, control requirements and communication structures of electrical grids that are developed via Matlab/Simulink are examined in this paper.

The distribution line is modeled according to realistic parameters of transmission line. The proposed power line communication (PLC) which is part of this study is managed by binary phase shift keying (BPSK) modems. It is also developed using carrier recovery to reduce destructive effects of the channel via Matlab/Simulink.[4]

With the various advances in load forecasting techniques,it is possible to perform load scheduling




effectively. Nowadays wireless communication techniques are replacing the older wire based systems. In this paper it is proposed to implement an automated system employing GSM & PLCC for the smooth operation of power generation & control. Load dispatch centre (LDC) will communicate with the individual power generation units & send scheduling based information through GSM techniques. The generation plants, in turn will actuate the scheduled data for their generation control using power line communication based SCADA system.[5]

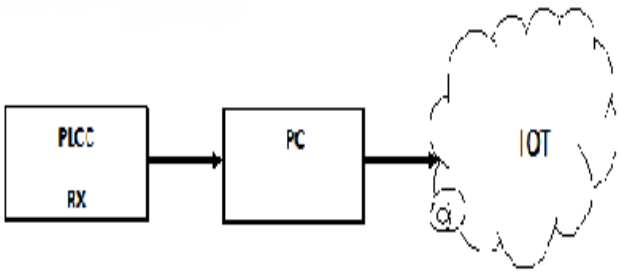
## III. PROPOSED ARCHITECTURE

### TRANSMITTER MODULE

### RECEIVER MODULE

## IV. PROPOSED METHODOLOGY

PLC modems are used to make communication in power supply networks. Data signal from conventional communication device is converted by PLC modem in a




form that is suitable for transmission over power lines. Although, power supply network is not designed for data communication.

PLC is divided into two groups: narrowband PLC allowing data rates up to 100 kbps and broadband PLC allowing data rates beyond 2 Mbps. Power-line communications systems operate by adding a modulated carrier signal to the wiring system.

Different types of power-line communications use different frequency bands. Since the power distribution system was

originally intended for transmission of AC power at typical frequencies of 50 or 60 Hz, power wire circuits have only a limited ability to carry higher frequencies. The propagation problem is a limiting factor for each type of power-line communications.

So, we are using plc technology to monitor patients health. A power line communication modem is used in which FSK [Frequency shift keying] is used for modulating the signal. Sensors connected to microcontroller via PLCC sends the data and in turn controls the devices.

Using PLCC it is possible to monitor patients remotely. This paper presents a PC based temperature monitoring and control system using virtual instrumentation. Temperature sensor measures the temperature and produce corresponding analog signal which is further processed by the microcontroller.

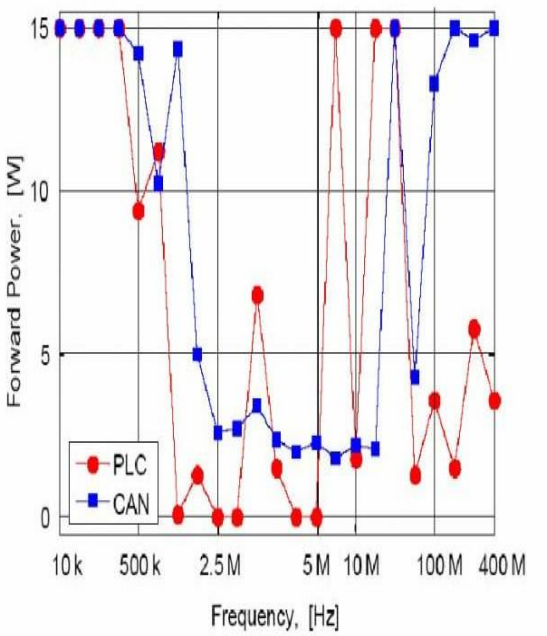
The data will be displayed on the LCD in microcontroller and PC monitor. Monitoring and control can be done with the help of control circuitry. We can use IOT to send the patients health information to the required medical assistant.

Hence this concept will be useful for health monitoring purpose which avoids the drawback in the previous methodology.

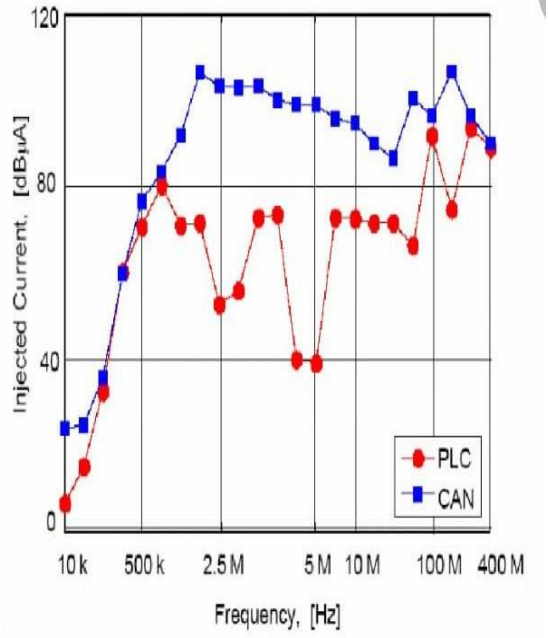
## V. RESULTS AND DISCUSSION

In the below graph figure(a) compares the forward power levels of PLC(power line communication) and CAN(controller area network).

The figure (b) compares the noise currents which shows that PLC has less noise level as the frequency increases when compared with CAN.




(a)




(b)

## VI. CONCLUSION

PLCC is a technique that allows exchange of data by means of electric power supply network that are presented in every dwelling, office and in every building. When compared to other communication mediums which are required in more number in an Industry to cover large areas in acres, PLC will provide one stop solution and will limit the cost. There will be no need to implement extra infrastructure as PLC will use existing Power lines. It provides Flexibility & Stability. It's easy to install. Power line communication can be used for many applications like Remote control, Emergency alarms,

Security purpose, overall Industrial Automation.

## VII. REFERENCE


1. Jiri Misurec, Milos Orgon, “High- speed data transfer using PLCC”, 25th International Conference on Systems, Signals Image Processing (IWSSIP), June 2018.

2. Sung- Guk Yoon,” Performance Analysis of Power Saving Strategies for Power Line Communications ”, International Conference on Smart Grid Communications , October 2017.

3. Yu Min Hwang, Jun Hee Jung, Jong Kwan Seo, Jae Jo Lee, Jin Young Kim,” Energy-Efficient Transmission Strategy with Dynamic Load for Power Line Communication ”,2017.

4. HananeHadlach, Hamid Touijer, Mustapha Zahir, Mohamed Habibi,” Modeling of a Smart Grid Monitoring System Xsing Power Line Communication”, International Renewable and Sustainable Energy Conference, December 2017.

5. SubhraJ.Sankar ,Palash K. Kundu,” A Proposed Method of Load Scheduing and Generation Control Using GSM and PLCC Technology”, Michael Faraday IET International Summit (MFIIS), September 2015.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