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Power Line Communication Technology-Based Advanced Patient Health Monitoring System

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Abstract: ***In recent years, open-source automation systems have progressed fast, resulting in more dependable communication networks. Power lines have grown more popular as a transmission medium in recent years, owing to their ease of installation and cheap cost. They are used in the creation of industrial and residential projects. Power line communication (PLC) is a technique that employs power lines as the physical medium for data transfer. Because the infrastructure has already been constructed, PLC provides a solution that does not need the installation of additional cables. When delivering data at a high rate across a power line, PLC modems are used in a variety of settings such as a residence, an office, a building, and a factory, among others. Because of the added telemetry functions, the cost of the devices has increased, making them unaffordable for all hospitals and clinics to purchase. Because of this, we are developing temperature, blood pressure, and heart rate monitoring technology that uses power line transmission as its foundation. This is a cost-effective piece of technology that communicates using existing power connections. Transmission and reception of signals via a power line cable are accomplished through the use of a power line modem (PLM). With the use of direct-sequence spread spectrum (DSSS) technology, signals may be modulated and demodulated. When compared to other communication technologies such as local area network (LAN), ZigBee, and Bluetooth, the cost of establishing a healthcare monitor utilising Power Line Communication (PLC) was relatively inexpensive compared to other communication technologies.***

IndexTerms:PLCTechnology,PLCmodem,EnergyEfficiency,ZigBee,FSK.

I. INTRODUCTION

Power lines are used as a physical medium for data transmission in this project. The primary goal of this research is to use PLCC technology to keep track of the well-being of the patients involved. Using the health parameters and data extraction procedures, the PLC modem is provided with an input signal. To communicate the data over the power line, a PLC transmitter is used.

During patient monitoring, a buzzer will sound to alert the doctor if an emergency arises, and a message will be sent to him by GSM. The receiver's data is retrieved and presented. The medical assistant and patient benefit from clear communication thanks to this initiative.

II. RELATEDWORKS

Inhospitals,medicalequipmentlikeECGmachines,ventilators,infusionpumps,heartbeatandbloodpressure monitorsareplacednearthepatientswhoneedmedica assistance. Automated patient monitoring systems (APMS) are available in certain hospitals' Medical Intensive Care Units (MICU). Central monitoring and storage of medical data are possible when various automated devices are networked together. Tele-surgery, telemedicine, and biotelemetry employing LAN, RF, ZigBee, and WAN are all examples of recent communication technologies in healthcare that are being used to conduct surgery and provide aid to patients. The medical industry is interested in providing assistance and providing medical treatment to both rural and urban areas in the United States.

PLC technology, which is backed by a variety of international standards, ensures fast data transport through power grids. Using this technology in places where there is no data network or another transmission channel is helpful. As an alternative to Wi-Fi, PLC technology may be utilised when the wall width prevents Wi-Fi from being used. A lot of attention has been paid to its potential use in smart homes. Modems are simple to set up and take little time at all. It's possible to connect a PLC modem to the electrical grid at home or in a building and have access to data.[1]

Due to the widespread use of power lines in smart grid devices, power line communications (PLC) have emerged as an option. Even though PLC stations may be powered by power lines, energy efficiency is still an issue. To do this, freshly announced PLC standards outline a power-saving strategy. Adaptive sleep time adjustment techniques are discussed here since the existing PLC power-saving plan only describes a basic constant sleeping approach. Verification of the delay performance and the energy consumption is done numerically as well as via simulations. For every kind of traffic, the two adaptive systems have been shown to provide an optimal balance between delay performance and power usage.[2]

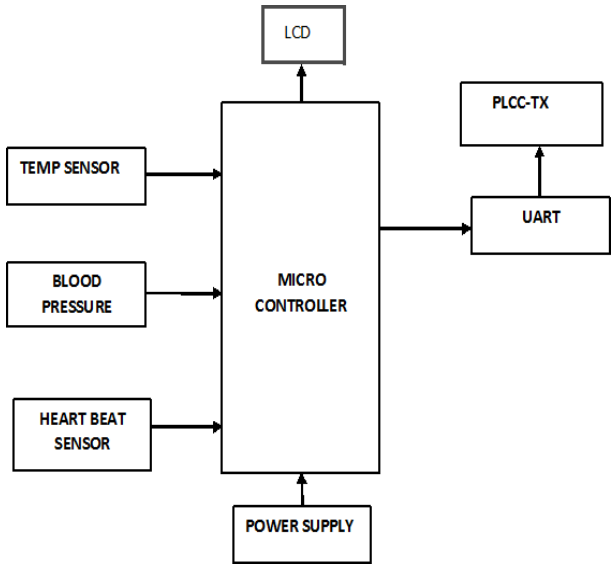
A dynamic load-based PLC system model and an energy-efficient resource allocation approach that maximises load impedance and transmission power were offered as novel models for EE maximisation in power line communication (PLC) systems. It is necessary to maximise the received power by optimising the load impedance while taking the channel characteristics into account since the characteristics of the power line channel impact the receiver's load impedance.

At the same time that we must ensure that transmitter transmission power cannot be increased above its maximum limit and that the lowest possible level of service quality is assured, we must maximise network EE.

Our research focused on optimising the three arguments based on orthogonal frequency division multiplexing downlink networks in multi-receiver PLC systems with the non-white Gaussian noise channel. Nonlinear fractional programming and Lagrange dual technique were used in an iterative algorithm that yielded the optimum value of the arguments for a tractable solution. The suggested system is more energy-efficient than the baseline systems, and the EE is considerably increased by the synergistic impacts of the impedance optimization and the subchannel allocation technique, according to simulation findings. [3]

Analysis of low-voltage grid dynamic activities will be examined in this study. There is a low-voltage grid, three-phase PI section line, three-phase transformer, and a load included in this demonstration. To better manage the Smart Grids, data transfer from diverse distributed energy resources and its communication infrastructure are combined. Consequently, this article examines the control needs and communication architectures of electrical grids constructed using Matlab/Simulink.

The distribution line is modelled according to the realisticparameters of a transmission line. The proposed powerline communication (PLC) which is part of this study ismanaged by binary phase-shift keying (BPSK) modems.It is also developed using carrier recovery to reducethe destructiveeffectsofthechannelviaMatlab/Simulink.[4]



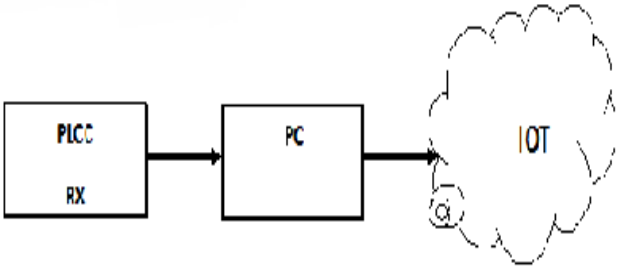
effectively.Wireless communication solutions are increasingly being used to replace outdated wired communication systems.

This study proposes to develop an automated system using GSM and PLCC for the smooth operation of power production and control, making use of the many improvements in load forecasting methods. Individual power producing units will interact with the load dispatch centre (LDC) and receive scheduling-based information through GSM. In turn, the power generating facilities will use a SCADA system based on a power line connection to activate the planned data for their generation control. [5]

III. PROPOSEDMETHODOLOGY

PLC modems are used to communicate with one another in power distribution networks. Using a PLC modem, data signals from traditional communication devices may be transformed into a format that is appropriate for transmission across power lines Despite this, the power distribution network is not intended for data transmission.

It is possible to split PLC into two groups: narrowband PLC, which allows data rates up to 100 kbps, and broadband PLC, which allows data rates of more than 2 Mbps. Power-line communications systems work by adding a modulated carrier signal to the existing wire system to communicate with one another.
Distinct forms of power-line communications employ different frequency bands, which is why they are classified as such. Since the electricity distribution system has been upgraded.



Power wire circuits, which were initially developed for the transmission of alternating current at normal frequencies of 50 or 60 Hz, have only a limited capacity to transmit higher frequencies. When it comes to power-line communications, the propagation issue is a limiting factor for each kind of communication.

As a result, we are using modern technology to monitor the health of our patients. A power line communication modem is employed, in which the signal is modulated using FSK [Frequency shift keying] and sent over a telephone line. Sensors attached to the microcontroller through PLCC transmit data to the microcontroller, which in turn controls the devices connected to it.

It is feasible to monitor patients from a distance with the help of PLCC. This article describes a temperature monitoring and control system that is based on a personal computer and uses virtual instrumentation. The temperature sensor monitors the temperature and generates an analogue signal, which is then processed by the microcontroller to create the final result.

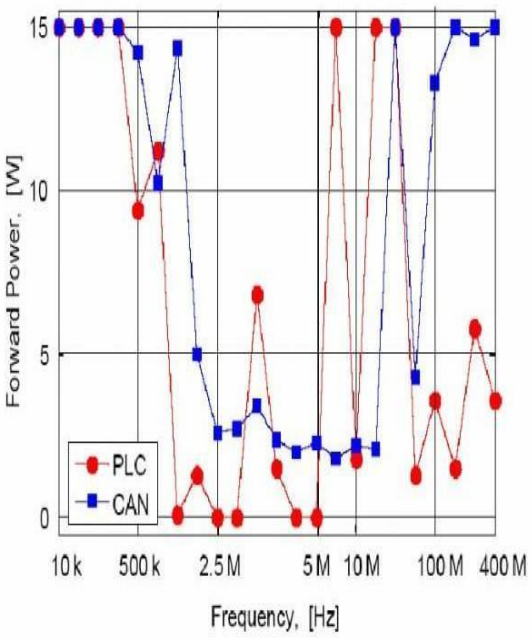
The data will be shown on the LCD of the microcontroller as well as the PC screen. The control circuitry may be used to provide monitoring and control functions. We can utilise the Internet of Things to convey health information about patients to the appropriate medical assistant.

The benefit of the current approach is that it eliminates the drawbacks of the prior technique, which makes it helpful for health monitoring purposes as well.

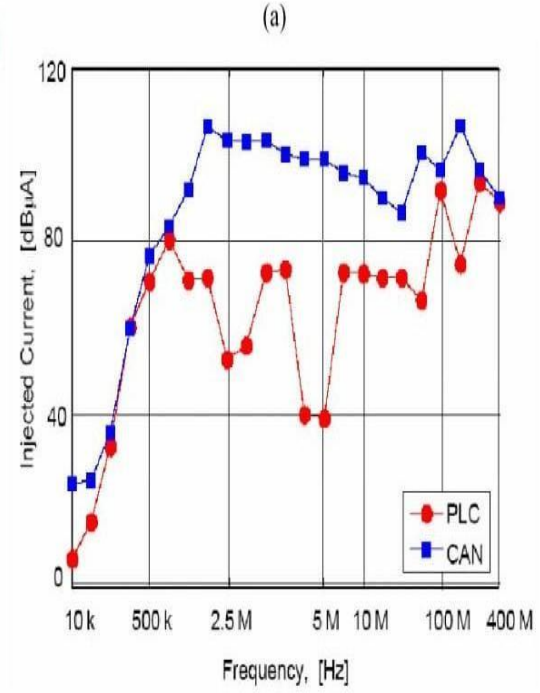
IV. RESULTSANDDISCUSSION

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

As shown in Figure (b), when the frequency of the PLC is increased in comparison to the frequency of the CAN, PLC has lower levels of noise as the frequency of the CAN rises.



(a)



(b)

V. CONCLUSION

PLCC is a technology that allows for the interchange of data via the use of an electric power supply network, which is present in every residence, workplace, and building on the planet. If you compare it to other communication mediums, which are needed in greater numbers in the industry to cover big regions in acres, PLC will give a one-stop solution while keeping costs down. Because PLC would make use of existing power lines, there will be no need to build any more infrastructure. It allows for more adaptability and stability. It's simple to put together. Power line communication may be utilised for a variety of applications such as remote control, emergency alarms, security, and general industrial automation, among others.

VI. REFERENCE

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