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Design & Development of Configurable Customize PLC for Power Line Communication and Control

[1]Shyam A. Gabhane
Department of Electronics & Communication,
Priyadarshnini Institute of Engineering and Technology,
Hingna Road, Nagpur.

[2]Abhijit D. Bijwe
Department of Electronics & Communication,
Priyadarshnini Institute of Engineering and Technology,
Hingna Road, Nagpur.

***Abstract*— This proposed work describes the development of PLC i.e. programming logic control for automatic controlling the functioning of various electromechanical machinery and devices which are used in the industries as well as at the home. A programmable logic device is very important as all production processes go through the fixed repetitive steps and sequence that involves decision and logical steps. We are about to used the medium of communication through existing power cable in Power line communication. We can provide the communication path between the devices using existing power line i.e. we can carry the data on the conductor without implementing the new path for communication. So in this concept we are going to design and develop a configurable and customize PLC for handling the power line communication control which will automatically operates devices continually once the command will be executed.**

Keywords –PLC, PDSL, PLN, FPGA Etc...

I. INTEODUCTION

Similar to power line communication, programming logic control is also abbreviated as PLC. Programming logic control is programmed software which helps to operate electromechanical machineries automatically according to command given by user through logical programmed. A programmable Logic Controller (PLC) is a specialized computer used for the automatic control and operation of manufacturing process and machineries [1]. It uses a programmable memory to store instructions and execute functions including on/off control, timing, counting, sequencing, arithmetic, and data handling[2] Programmable logic controller (PLCs) has become an indispensable control unit in the industrial control field. But the performance of traditional PLC will be restricted by the length of ladder diagram and the operation speed of the microprocessor. power line communication (PLC) has received tremendous attention in recent years as an alternative and economical technology [3,4]. Normally local utility has had to balance energy demand by local customers with energy supply. The energy supply came from power plants run by the local utility and /or the regional utility. To enable bidirectional flow of information, power line communication (PLC) systems have been developed to used in every part of the grid In Power line communication we can provide the communication path between the devices using existing power line i.e. we can carry the data on the conductor without implementing the new path for communication. As power line communication ismost economical way for communication but has lots of problems i.e. attenuation, losses etc. But in the recent year lots of work has been done to reduce the drawbacks in power line communication to make it suitable for high quality data communication. In this paper we proposed to develop programming logic control system for automation of of machinery while carrying a data through power line communication which can control the automation of machineries economically and dynamically.

II. LITERATURE REVIEW

Various approaches have been used for power line communication and programmable logic control such as power-line communication (PLC) signal processing method based on wavelet packet analysis, programmable logic controllers function based on FPGA [6] etc. We briefly review previous works used in power line communication based on different technology. In this approach we are going to develop programming logic control for power line communication which can be used for automation in industries and home using power line communication. Early PLCs were designed to replace relay logic systems. These PLCs were programmed in ladder logic, which strongly resembles a schematic diagram of relay logic. This program notation was chosen to reduce training demands for the existing technicians. Other early PLCs used a form of instruction list programming, based on a stack-based logic solver.

Modern PLCs can be programmed in a variety of ways, from the relay-derived ladder logic to programming languages such as specially adapted dialects of BASIC and C. Another method is State Logic, a very high-level programming language designed to program PLCs based on state transition diagrams.

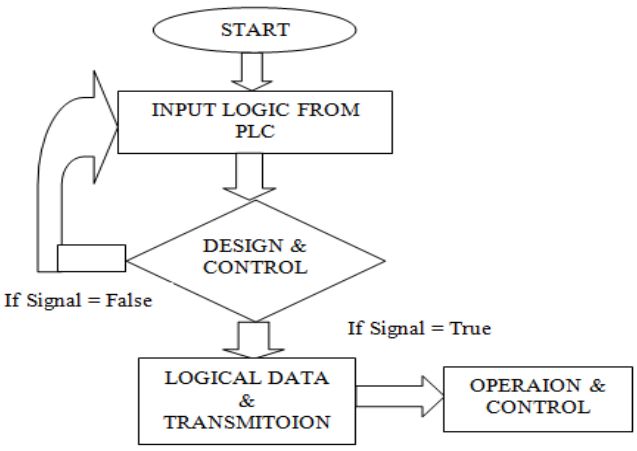
Many early PLCs did not have accompanying programming terminals that were capable of graphical representation of the logic, and so the logic was instead represented as a series of logic expressions in some version of Boolean format, similar to Boolean algebra. As programming terminals evolved, it became more common for ladder logic to be used, for the aforementioned reasons and because it was a familiar format used for electromechanical control panels.

Newer formats such as State Logic and Function Block (which is similar to the way logic is depicted when using digital integrated logic circuits) exist, but they are still not as popular as ladder logic. A primary reason for this is that PLCs solve the logic in a predictable and repeating sequence, and ladder logic allows the programmer (the person writing the logic) to see any issues with the timing of the logic sequence more easily than would be possible in other formats.

The PLC is primarily used to control machinery. A program is written for PLC which operates the functionality of machines based on the input conditions and the internal program. A Programmable Logic Controller i.e. PLC or Programmable Controller is a digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. PLCs are used in many industries and machines. Unlike general-purpose computers, the PLC is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operation are typically stored in battery-backed-up or non-volatile memory. A PLC is an example of a hard real-time system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result

. In this aspect PLC is similar to computer. However PLC is designed to programmed once and run repeatedly as needed. In fact a crafty programmer could use a PLC to control not only simple devices such as a garage door opener, but their whole house , including switching light on and off at certain times, monitoring a custom built security system etc.

Most commonly, a PLC is found inside of a machine in an industrial environment. A PLC can run an automatic machine for years with little human intervention. They are design to withstand most harsh environments. In this concept we will



going to design and developed PLC concept using programming in embedded c, Dot Net languages which will be executed and run the machineries automatically in power line communication network.

Fig. Flow chart Programming logic control.

III. POWER LINE COMMUNICATION

Power line communication (PLC) carries data on a conductor that is also used simultaneously for AC electric power transmission or electric power distribution to consumers. It is also known as power line carrier, power line digital subscriber line (PDSL), mains communication, power line telecommunications, or power line networking (PLN).

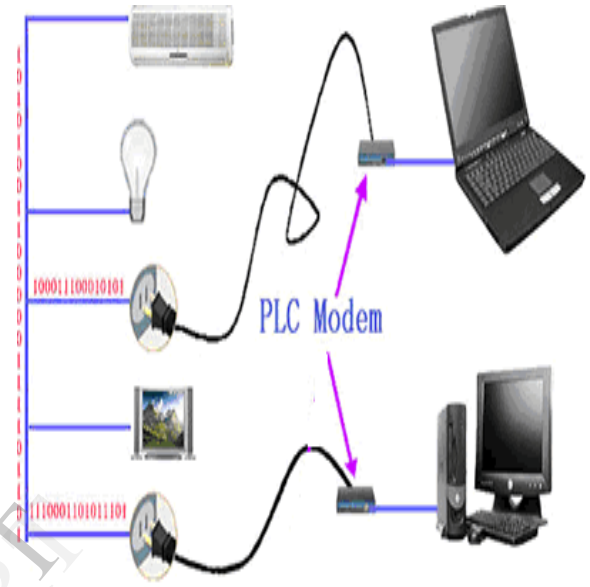


Fig. power line communication

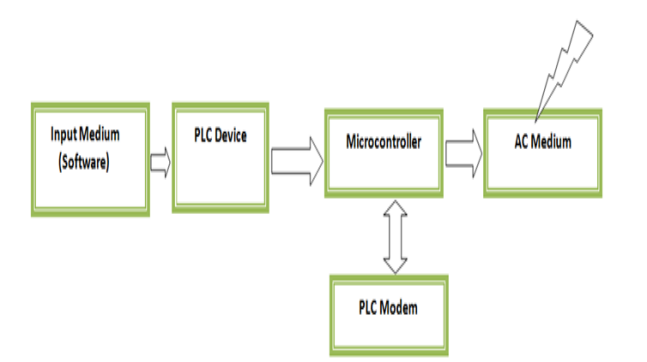
A. POWER LINE MODEM

Power line modem is useful to send and receive serial data over existing AC mains power lines of the building. It has high immunity to electrical noise persistence in the power line and built in error checking so it never gives out corrupt data. The modem is in form of a ready to use circuit module, which is capable of providing 9600 baud rate low rate bi-directional data communication. Due to its small size it can be integrated into and become part of the user's power line data communication system

IV. BLOCK DIAGRAM

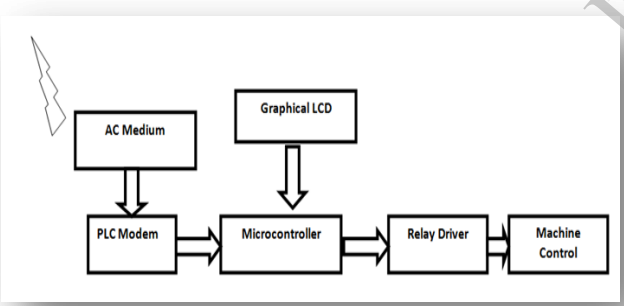
Transmitting End:

In the transmitter case the input medium will be the software (Programming logic and control) interfaced with the microcontroller for process the information to the PLCC Modem. Here PLC Modem will be act as a transmitting medium of communication via AC Medium.



Receiver End:

In the receiver end the PLC modem will receive the signal from the electrical lines and send it to the microcontroller for its further processing. Here the digital signal coming from the microcontroller will be directly given to the relay driver for driving the relay and switch on the machine as per the logic.



V. APPLICATION:

- Home Automation
- Automatic Meter Reading
- Process Control
- Heating & Ventilation, Air conditioning Control
- Lighting Control
- Status Monitoring and Control
- Low Speed Data Communication Networks
- Intelligent Buildings
- Sign and Information Display
- Fire and Security Alarm System
- Remote Sensor Reading
- Data/File Transfer
- Fire & Security Alarm System
- Power Distribution Management

VI. CONCLUSION

In the transmitter case the input medium will be the software (Programming logic control) interfaced with the microcontroller for process the information to the PLC Modem. Here PLC Modem will be act as a transmitting medium of communication via AC Medium. In the receiver end the PLC modem will receive the signal from the electrical lines and send it to the microcontroller for its further processing. Here the digital signal coming from the microcontroller will be directly given to the relay driver for driving the relay and switch on the machine as per the logic.
In this way we are going to interface programmable logic control in power line communication so as to work efficiently and economically.

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[6] Zhu Huabing*, Liang Benlei, Dong Bolin, Feng Xiao School of Mechanical and Automotive Engineering of Hefei University of Technology, China *Corresponding to anthor, e-mail: hfuthbzhu@163.comTELKOMNIKA, Vol. 11, No. 12, December 2013,