A Review on Hot Line communication for Lifts

Miss.Nayan Sanjay Rajoba[1], Prof.M.M.Raste[2]

[1] PG student, Department of electronics and telecommunication engineering, Annsaheb dange college of engineering and technology, Ashta, Maharashtra, India

[2]Professor, Department of electronics and telecommunication engineering, Annsaheb dange college of engineering and technology, Ashta, Maharashtra, India

Abstract *— Now a days, there are many technologies that have been developed for data transmission, Hot line communication is one of the technologies that have proved useful for data transmission over a power line. Hot line communication is implemented using the concept of power line communication. Hot line communication system is a system whereby communication signals were sent & received on household & industrial 50hz bearing power line. The aim of the project is to design & develop low cost narrowband power line communication modem circuit to monitor the lift status information for controlling the lift. The transmitter information for communication is generated by a lift using without interruption power supply. The information is transmitted through 230V supply line to receiver using power line carrier module. Then the system will receive data and display the information to LCD of lift car.*

Keywords *— Hot line communication, PLC1672 (PLC modem), Lift, Lift UPS.*

I. INTRODUCTION

Power line carrier communication has recently become a popular technology for automation & networking.

Lifts are used for moving people and goods from one floor to another hence called as vertical transportation machine. Lifts are used for mass customization. A lift is essentially a platform that is either pulled or pushed up by a mechanical means. Lift consists of cab mounted on platform within an enclosed area. An off line UPS consists of three sections. The offline UPS consists of inverters, batteries and chargers.UPS is having 3 phase supply for the input as well as output. The elevator uses 3 phase supply. The lift UPS works on 3 phase and charges the batteries when the power cut happens, at that time inverter turn on the batteries to feed load.

Hot line communication is a technology that uses power lines as its communication medium. Hot line communication provides narrow band data on conductors already used for electric power transmission. HLC offers a unique no new infrastructure approach to enabling rapid growth of energy management technology around the earth. Hot line communication is easy to install technology for many applications.

II. PROPOSED SYSTEM

A. Block Diagram

The main objective of the hot line communication system is the removal of extra wires connected for data transmission and also to overcome the radio frequency range problem. The system design consists of hardware and software design. The system includes PIC microcontroller, transmitting and receiving circuit, PLC modem PLC1672, power supply circuit for PLC1672. The design of hot line communication system can be divided into data transmission and reception according to the data flow. For designing a cost effective system without using internet and wi-fi following block schematic is designed:-

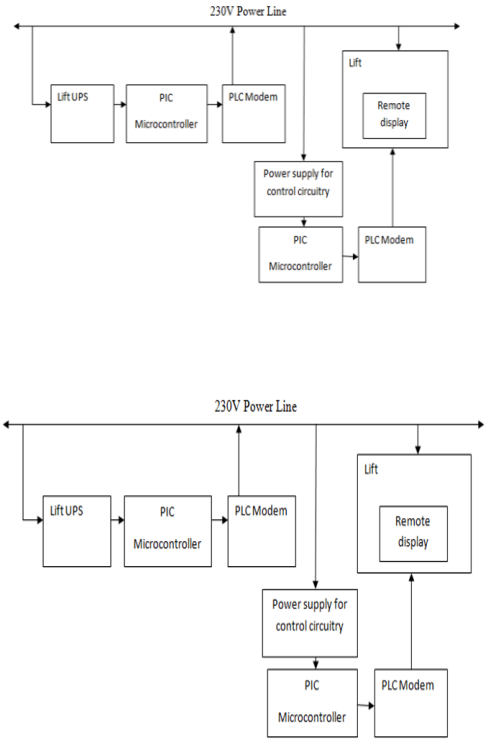


Figure 1. Block schematic of system

The basic block schematic of data transmission through power line consists of various blocks.

a). PIC Microcontroller (PIC18f25J11) –

PIC18f25J11 is a family of 8 bit microcontrollers. This microcontroller is having 5.5V tolerant input having digital pins. It is self programmable under software control. It is having single supply in circuit serial programming via two pins. Operating range of the PIC microcontroller is 2.0v to 3.6v.

PIC18f25J11 is a family incorporates a range of series and parallel communication peripherals.

b). PLC Modem (PLC1672) –

The device used for the communication over power supply cables is called as power line communication modem. A power line modem is a device which consists of a Unix connector provided for easy screwing of power line cable and relimate connector provided for easy interfacing with the transmitter and receiver circuit

Figure 2. PLC1672

PLC1672 is a power line module designed to send serial data via power line. power line modem is a communication module which send data on the mains power lines. It uses existing lines to transfer both AC and the data from the power line. It provides both directional communications in half duplex mode i.e either transmit or receive data at one time.

The module uses serial communication at the baud rate of 9600bps. The interfacing is to connect PIC microcontrollers transmitter line to modules receiver line and PIC microcontrollers receiver line to modules transmitter line.

This power line communication mosem used frequency shift keying modulation technique with the frequency of 72KHz. The module is having onboard voltage regulator so the external supply of 12-24 volt DC is required.

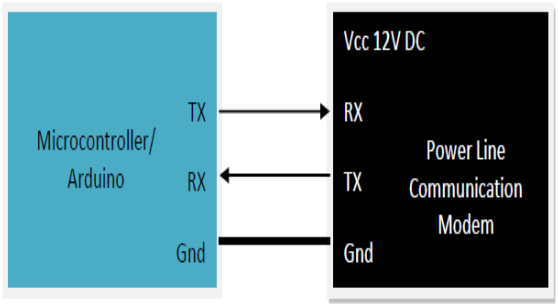


Figure 3. Connection diagram for PLC1672

There are two LED's s1 and s2 provided onboard.

S1: when the data is being sent over power line modem,the green LED blinks.

S2: when the data is being received over power line modem,the red LED blinks.

Power line communication are used for different application such as home automation,data acquisition system, automatic meter reading and lighting control.

FUNCTIONS	VALUE
Power supply	DC 12-24 volt (12 volt recommended)
Maximum current	200mA
Default baud rate	9600
Communication type	Half duplex communication
Working environment	230v,50Hz
Communication distance	100 Meters
Power line carrier frequency	72KHz
Modulation and demodulation mode	Frequency shift keying

Table -1 functional values of PLC1672

c). Power Line –

Power line is nothing but a 230v electrical power line used to give power supply to the lift and UPS.

d). UPS (Uninterruptible Power Source) –

An uninterruptible power supply or uninterruptible power source is an device used to provide emergency power to a load when there is problem of power cut. It is used to provide small power when the source power supply fails. The UPS can be differentiated by 3 main types: on line, line interactive and standby. In the standby system lift is powered directly by the source input and battery power is only used when the mains power fails.

III. ALGORITHMIC STEPS

[1] Lift UPS generates the data which will be received by transmitter.
[2] Process the data in PIC microcontroller (PIC18f25j11)
[3] Digital data is transmitted to the PLC modem.
[4] Output of the PLC modem given to the power line
[5] Receive the data using PIC microcontroller and PLC modem.
[6] Display the UPS status information to the lift.

IV. EXPERIMENTS AND RESULTS

The proposed scheme is tested using some parameters. The serial communication is carried out first for checking the 9600bps baud rate matching for the transmitter and receiver. The letter 'N' is transmitted serially from transmitter to receiver via a direct communication line connected in between. The picture shows the result for the serial transmission and reception.

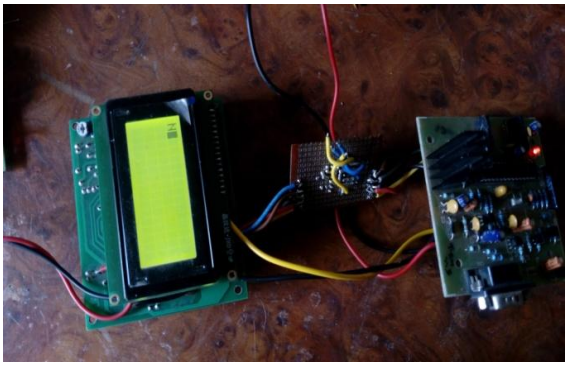


Figure 4. Serial transmission

The transmission data results are displayed on the digital storage oscilloscope as shown in picture below:

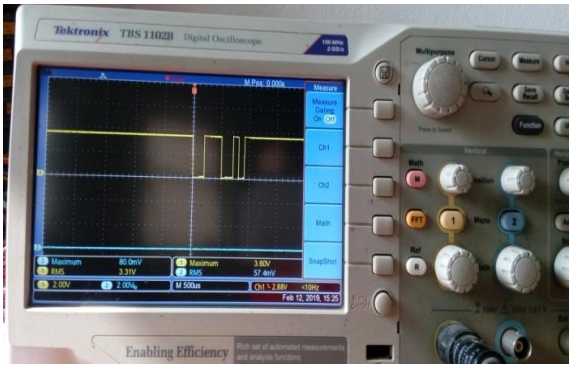


Figure 5. Data waveform for letter 'N' on DSO

The overall system structure of the Hot line communication for lifts is shown in the picture below which consisits of the SMPS circuit, transmitter circuit, receiver circuit, PLC1672 circuit and 7812 circuit ans 230v power supply.

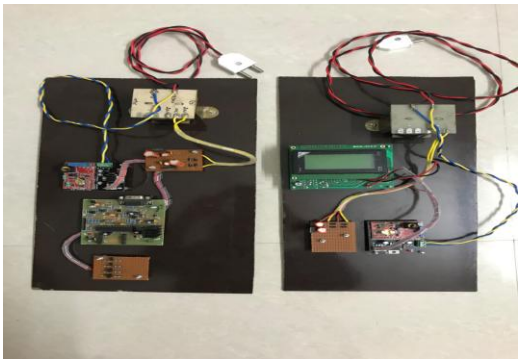
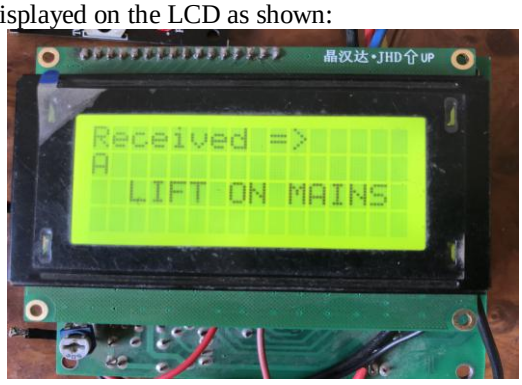


Figure 6.Hot line communication circuit

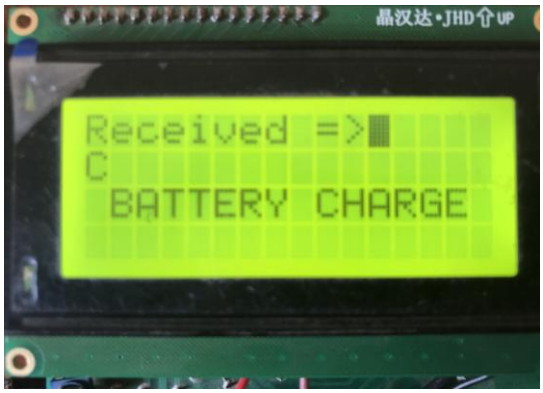
Hot line communication for lifts is an easy way for the communication between lift UPS and remote Lift car. The LCD display placed at the lift shows us the information regarding the lifts working. it is an auto emergency rescue device.

When the lift is running on the 3 phase mains supply , the lift UPS will send the character 'A' to the remote lift car through the power line and message is displayed on the LCD as shown:



When the lift is running on the battery mode, the lift UPS will send the character 'B' to the remote lift car through the power line.

When the batteries are fully charged the UPS will give indication by sending the character C' through the power line.
"battery charge" message will be displayed on the LCD of lift.



When the lift is running on the battery mode and the battery is about to low, the character 'D' is send from UPS to lift car via power line.

IV. CONCLUSIONS

Hot line communication is a technique that used for transfer of data using power line cable. This systems are affordable and reliable. This work contributes to words the development of lift UPS communication. A hot line communication system can provide significant cost savings as well as a great comfort for occupants as no wireless medium is used. As part of future work power line communication will be applied with more number of applications.

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