ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Application of Narrowband Power – Line Communication in Medium Voltage Smart Distribution Grids

A.Saraswathi
PG Scholar
Department of ECE (VLES),
Siddhartha Institute of Engineering and Technology,
Hyderabad, India.

Mrs.P.Sony
Assistant Professor
Department of ECE,
Siddhartha Institute of Engineering and Technology,
Hyderabad, India.

Dr.D.Subba Rao, M.Tech, Ph.D
HoD,
Department of ECE,
Siddhartha Institute of Engineering and Technology,
Hyderabad, India.

Abstract

Data Security is primary concern for every communication system. There are many ways to provide security data that is being communicated.

However, what if the security is assured irrespective of the hackers are from the noise. This Project describes a design of effective security for data communication by designing for data transmission.

Introduction

Power-line communication (**PLC**) is a communication protocol that uses electrical wiring to simultaneously carry both data, and Alternating Current (AC) electric power transmission or electric power distribution. It is also known as power-line carrier, power-line digital subscriber line (PDSL), mains communication, power-line telecommunications, or power-line networking (PLN).

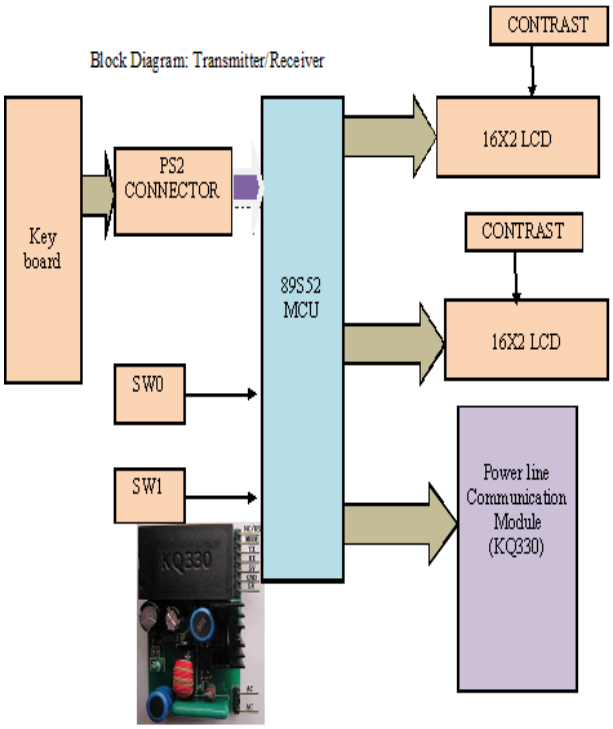
A wide range of power-line communication technologies are needed for different applications, ranging from home automation to Internet access which is often called broadband over power lines (BPL). Most PLC technologies limit themselves to one type of wire (such as premises wiring within a single building), but some can cross between two levels (for example, both the distribution network and premises wiring). Typically transformers prevent propagating the signal, which requires multiple technologies to form very large networks. Various data rates and frequencies are used in different situations. A number of difficult technical problems are common between wireless and power-line communication, notably those of spread spectrum radio signals operating in a crowded environment. Radio interference, for example, has long been a concern of amateur radio groups.

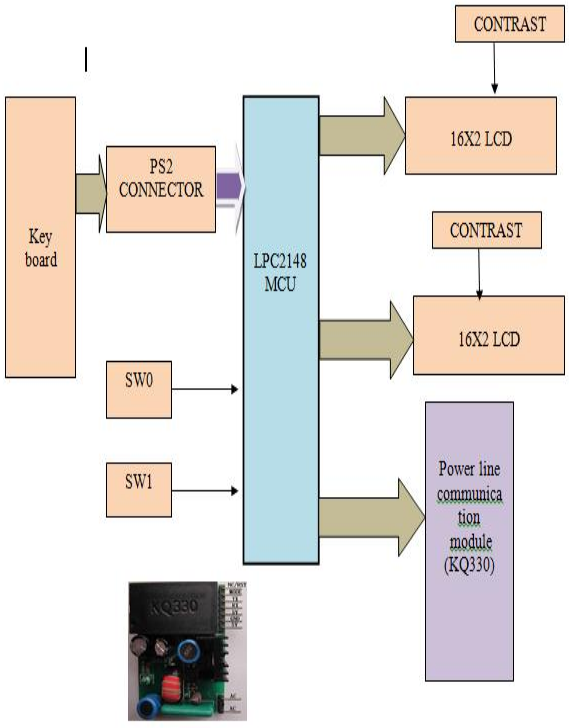
Proposed project

The source information is generated by a key board and this will be sent to destination through KQ330 (power line module) communication. The receiving system will check the data and displays on the LCD. The power line module communication used here are KQ330 Transmitter/Receiver, The transmitter stage must be carefully designed to take digital signals from the MCU, filter them to eliminate out of band emissions and drive the low impedance of the AC power line. In receiver section of the power line module receive the data through the power line communication module (KQ330) and send to the receiver section of the microcontroller unit and display on the LCD.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

This project uses regulated 3.3V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

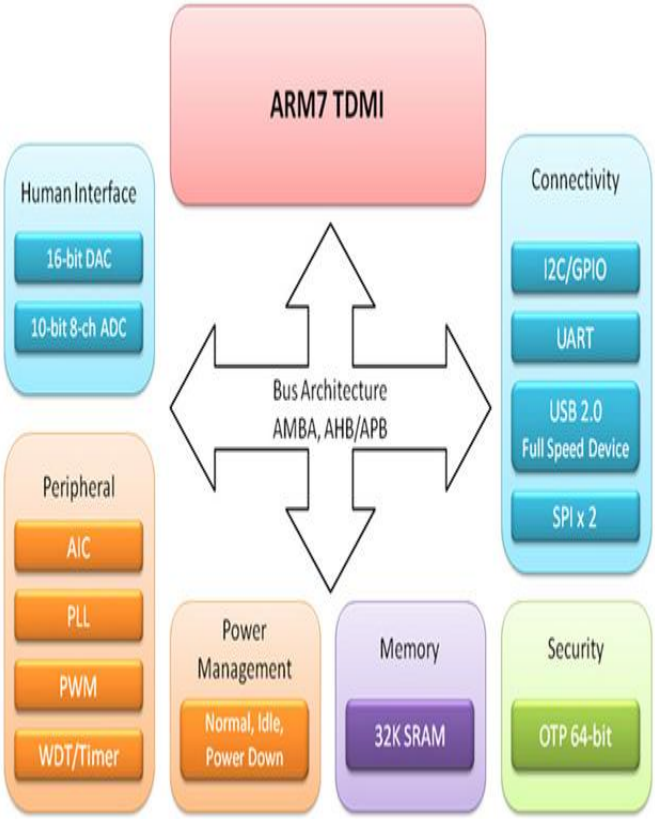




Hardware requirements

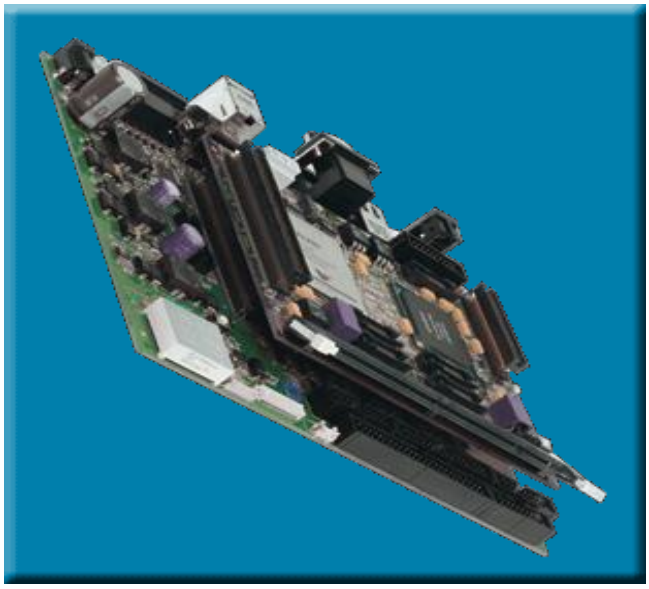
The **LPC2148** are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.



ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

ARM PROCESSOR



ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI
  T: Thumb, 16-bit compressed instruction set
  D: on-chip Debug support, enabling the processor to halt in response to a debug request
  M: enhanced Multiplier, yield a full 64-bit result, high performance
  I: Embedded ICE hardware
- Von Neumann architecture

AT89S52

FEATURES

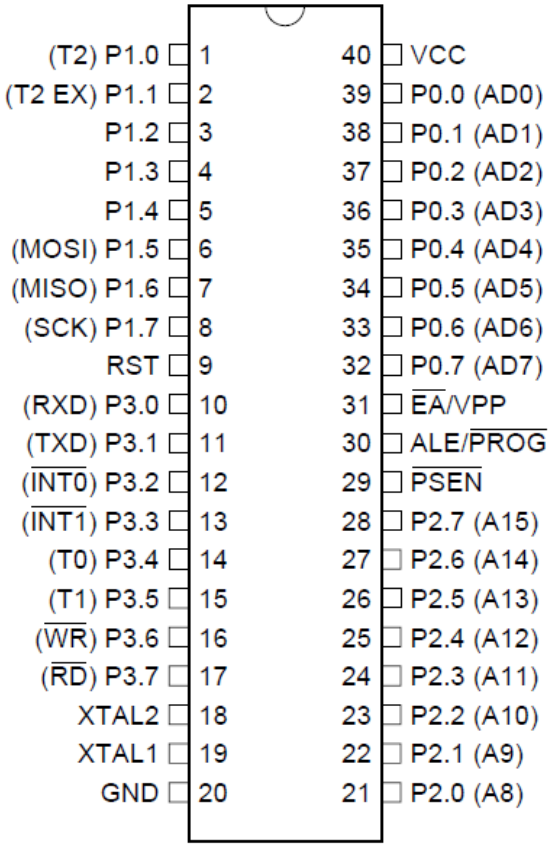
- Compatible with MCS-51® Products
- 8K Bytes of In-System Programmable (ISP) Flash Memory

– Endurance: 1000 Write/Erase Cycles

- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Dual Data Pointer
- Power-off Flag

PIN CONFIGURATION

PDIP



KQ330

The system includes the STC microcontroller (the core processor), FSK-KQ330 module (a modem module), the data transmitting circuit, the data receiving circuit, the zero-crossing detecting circuit, the magnifying circuit of triodes, the resonant circuit and the transformer isolation circuit. Master-slave system can transmit data signals over power lines to achieve the remote control of the host machine. The core of the system includes

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Two parts: one is that STC microcontroller controls the power line carrier module FSK-KQ330 module to send and receive data; the other is that Power line carrier part is composed of power line carrier module FSK-KQ330 and peripheral circuit (resonance detection circuit and amplifier circuit).

Software Used

- Keil Compiler
- Embedded C

Advantages:

- Efficient communication
- Text can be entered
- Power can also be transmitted
- Data will not be lost

Conclusion:

The power line module communication used here are KQ330 Transmitter/Receiver, The transmitter stage was carefully designed to take digital signals from the MCU, filter them to eliminate out of band emissions and drive the low impedance of the AC power line. In receiver section of the power line module receive the data through the power line communication module (KQ330) and send to the receiver section of the microcontroller unit and display on the LCD.

REFERENCES

1. A Strategy for Smart Sustainable and Inclusive Growth.

2. "Horizon 2020-The framework programmer for research and innovation", Communication from the Commission to the European Parliament the Council the European Economic and Social Committee and the Committee of the Regions Std., 2011.

3. "Technology action plan: Smart grids", Report to the Major Economies Forum on Energy and Climate, 2009.

4. Smart Grids-European Technology Platform for the Electricity Network of the Future Strategic Deployment Document, 2010.

5. A. Ipakchi and F. Albuyeh, "Grid of the future", IEEE Power Energy Mag., vol. 7, no. 2, pp. 52-62, 2009.

6. "Regola tecnica di riferimento per la connessione di utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica", Reference Technical Rules for the Connection of Active and Passive Users to the LV Electrical Utilities CEI Standard.

7. "Generators connected to the low-voltage distribution network", Technical Requirements for the Connection to and Parallel Operation with Low-voltage Distribution Networks, 2011.

8. Photovoltaic (PV) Systems-Characteristics of the Utility Interface, 2004.

9. Test Procedure of Islanding Prevention Measures for Utility Interconnected Photovoltaic Inverters, 2008.

10. IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems, 2003.

11. IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems, 2000.

12. P.P. Parikh, M.G. Kanabar and T.S. Sidhu, "Opportunities and challenges of wireless communication technologies for smart grid applications", Proc. IEEE Power and Energy Society General Meeting, pp. 1-7, 2010.

AUTHORS' BIOGRAPHY

A.Saraswathi, has completed her B.Tech in Electronics and Communication Engineering from Keshav Memorial Institute of Technology, Narayanguda, Hyderabad, J.N.T.U.H Affiliated College. She is pursuing her M.Tech in VLSI &

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Embedded Systems from Siddhartha College of Engineering and Technology, Hyderabad, J.N.T.U.H Affiliated College.

Mrs.P.Sony is an Assistant Professor at Siddhartha Institute of Engineering and Technology, Ibrahimpatnam, Hyderabad in ECE Department. She received her B.Tech degree in Electronics and Communication Engineering from Sri Indu College of Engineering & Technology, Sheriguda Ibrahimpatnam and M.Tech degree in Embedded Systems from Vidya Vikas Engineering College, Chevella.

Dr. D Subba Rao, is a proficient Ph.D person in the research area of Image Processing from Vel-Tech University, Chennai along with initial degrees of Bachelor of Technology in Electronics and Communication Engineering (ECE) from Dr. S G I E T, Markapur and Master of Technology in Embedded Systems from SRM University, Chennai. He has 13 years of teaching experience and has published 12 Papers in International Journals, 2 Papers in National Journals and has been noted under 4 International Conferences. He has a fellowship of The Institution of Electronics and Telecommunication Engineers (IETE) along with a Life time membership of Indian Society for Technical Education (ISTE). He is currently bounded as an Associate Professor and is being chaired as Head of the Department for Electronics and Communication Engineering discipline at Siddhartha Institute of Engineering and Technology, Ibrahimpatnam, Hyderabad. Technology and Design, communication systems and Digital electronics.