

PLC based Home Automation System

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Abstract— Programmable Logic Controller (PLC) is utilized extensively for automation of electromechanical processes. In this study, a home automation system is designed using PLC. The proposed control module will consist of software simulation and hardware implementation. The control module provides multiple components fault detection, tolerance and switch on or off in critical areas. The system is easy to build, service, modify and it provides reliable communication of home automation with reduced cost. In this paper, we propose the idea of designing a smart home with optimized energy consumption. The system is programmable to meet demands, adding different home appliances in short time by optimizing the entire hardware assembly and software algorithms. The PLC is easy to understand and the system provides multiple solutions by using a single component. Although new but more efficient than previous systems, the PLC can become the epicenter to many new applications. Once the system is designed and implemented; the only cost is that of maintenance. It is also possible to combine PLC model with other devices such as GSM. Such kind of an application will be extremely beneficial for the aged and disabled people by offering voice control and safety items.

Keywords— Programmable Logic Controller, Fault detection, Software Algorithms, GSM.

I. INTRODUCTION

PLC can help in achieving complete automation e.g. an air conditioning system can be switched on before the owner reaches his home especially in summer. A PLC based security system will detect smoke, excessive electrical power usage, burglar attempts and unauthorized movements in the house and send alert messages. This is the idea behind designing home automation system using PLC and there is no end to its applications. Advanced and more reliable PLCs are now being developed that can maintain a record of household items, record their usage through RFID (Radio Frequency Identification), automatically order replacements etc. Home automation is a key term when we refer a smart home, a home that can detect and distinguish, automatically adjust the lighting as per user's requirement, open doors automatically when combined with proper sensors, switch on the security lights at night and switch them off in morning without any interference in the user's schedule, heat water for bathing and tea making, accessing anywhere in the world via internet, a live video of what is happening in your surroundings [1]. This is possible via one centrally controlled system. Nowadays, it has become essential to have an automated home which can range from remote, set burglar alarm and hi-tech security gates.

II. LITERATURE SURVEY

Various home automation systems have been designed and the system coding depends on number of applications to be controlled. The reason for its tremendous growth has been attributed to various informal research and designs. The types of home automation systems based on their control systems are:

A. Individual Control System-

This type of control system is considered to be the predecessor of modern day control systems. Here each device like heater or air conditioner will have an independent control dedicated to it. Following are the various individual control systems:

- Wired remote controller
- High-spec wired remote controller
- Timer remote controller
- Wireless remote controller
- Simplified remote controller
- Remote sensor

B. Distributed Control System-

A distributed control system is a type of control system. In this, the control systems are distributed throughout the system, but there is a central operator supervisory control. The main feature of this type of system is emergency shut-down. This system can be pre-set or the control parameters of several similar devices can be varied as per requirement. For example, controlling the thermostats of several air conditioners and their ON/OFF timings [3].

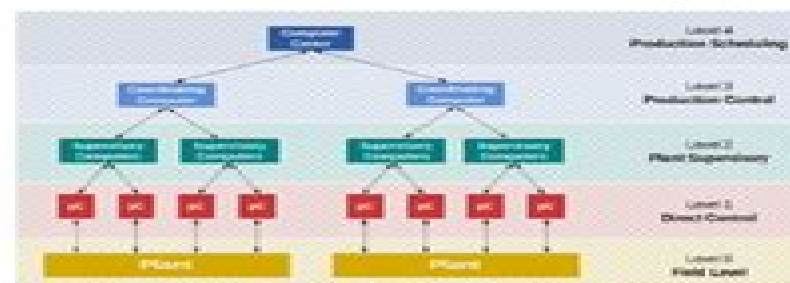


Figure 1: Distributed control system (Source: Wikipedia)

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Power Line Communications Lutz Lampe, Andrea M. Tonello, Theo G. Swart, 2016-04-14 This second edition of Power Line Communications will show some adjustments in content including new material on PLC for home and industry PLC for multimedia PLC for smart grid and PLC for vehicles Additional chapters include coverage of Channel Characterization Electromagnetic Compatibility Coupling and Digital Transmission Techniques This book will provide the reader with a wide coverage of the major developments within the field With contributions from some of the most active researchers on PLC the book brings together a wealth of international experts on specific PLC topics [Absolute Beginner's Guide to Home Automation](#) Mark Edward Soper, 2005-06-08 Get the home of tomorrow today Absolute Beginner's Guide to Home Automation will help you turn your ordinary home into a high tech haven Want to schedule your lights to turn on while you're on vacation Stuck late at work and want to start the roast you put in the crock pot this morning You can make it all happen with the help of existing 110V electrical wiring in your home and this step by step tutorial Through simple do it yourself instructions you will walk through the process of outfitting every room in your home with a network connection that you can control with a few clicks on your computer keyboard Complete with illustrations and photographs Absolute Beginner's Guide to Home Automation will have you riding the wave of the future in no time [Home Automation and Wiring](#) James Gerhart, 1999 Home automation creates the ability to control everyday home systems through one electronic source The home of the 21st century will be fully automated This book sets out to give builders and contractors the information they need to plan and install new systems and repair existing ones *Smart Computing* Mohammad Ayoub Khan, Sanjay Gairola, Bhola Jha, Pushkar Praveen, 2021-06-22 The field of SMART technologies is an interdependent discipline It involves the latest burning issues ranging from machine learning cloud computing optimisations modelling techniques Internet of Things data analytics and Smart Grids among others that are all new fields It is an applied and multi disciplinary subject with a focus on Specific Measurable Achievable Realistic Timely system operations combined with Machine intelligence Real Time computing It is not possible for any one person to comprehensively cover all aspects relevant to SMART Computing in a limited extent work Therefore these conference proceedings address various issues through the deliberations by distinguished Professors and researchers The SMARTCOM 2020 proceedings contain tracks dedicated to different areas of smart technologies such as Smart System and Future Internet Machine Intelligence and Data Science Real Time and VLSI Systems Communication and Automation Systems The proceedings can be used as an advanced reference for research and for courses in smart technologies taught at graduate level [Handbook of Research on the Internet of Things Applications in Robotics and Automation](#) Singh, Rajesh, Gehlot, Anita, Jain, Vishal, Malik, Praveen Kumar, 2019-09-13 With near universal internet access and ever advancing electronic devices the ability to facilitate interactions between various hardware and software provides endless possibilities Though internet of things IoT technology is becoming more popular among individual users and

companies more potential applications of this technology are being sought every day There is a need for studies and reviews that discuss the methodologies concepts and possible problems of a technology that requires little or no human interaction between systems The Handbook of Research on the Internet of Things Applications in Robotics and Automation is a pivotal reference source on the methods and uses of advancing IoT technology While highlighting topics including traffic information systems home security and automatic parking this book is ideally designed for network analysts telecommunication system designers engineers academicians technology specialists practitioners researchers students and software developers seeking current research on the trends and functions of this life changing technology **From Smart Grid to Internet of Energy**

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IoT and Analytics in Renewable Energy Systems (Volume 2) O.V. Gnana Swathika,K. Karthikeyan,Sanjeevikumar Padmanaban,2023-08-11 Smart cities emanate from a smart renewable energy aided power grid The smart grid technologies offer an array of benefits like reliability availability and resiliency Smart grids phenomenally contribute to facilitating cities reaching those sustainability goals over time Digital technologies such as the Internet of Things IoT automation artificial intelligence AI and machine learning ML significantly contribute to the two way communication between utilities and customers in smart cities Five salient features of this book are as follows Smart grid to the smart customer Intelligent computing for smart grid applications Novel designs of IoT systems such as smart healthcare smart transportation smart home smart agriculture smart manufacturing smart grid smart education smart government smart traffic management systems Innovations in using IoT and AI in improving resilience of smart energy infrastructure Challenges and future research directions of smart city applications *Visible Light Communications* Zabih Ghassemlooy,Luis Nero Alves,Stanislav Zvanovec,Mohammad-Ali Khalighi,2017-06-26 Visible Light Communications written by leading researchers provides a comprehensive overview of theory stimulation design implementation and applications The book is divided into two parts the first devoted to the underlying theoretical concepts of the VLC and the second part covers VLC applications Visible Light Communications is an emerging topic with multiple functionalities including data communication indoor localization 5G

wireless communication networks security and small cell optimization This concise book will be of valuable interest from beginners to researchers in the field FiWi Access Networks Martin Maier,Navid Ghazisaidi,2011-12-15 The evolution of broadband access networks toward bimodal fiber wireless FiWi access networks described in this book may be viewed as the endgame of broadband access After discussing the economic impact of broadband access and current worldwide deployment statistics all the major legacy wireline and wireless broadband access technologies are reviewed State of the art GPON and EPON fiber access networks are described including their migration to next generation systems such as OCDMA and OFDMA PONs The latest developments of wireless access networks are covered including VHT WLAN Gigabit WiMAX LTE and WMN The advantages of FiWi access networks are demonstrated by applying powerful network coding heterogeneous optical and wireless protection hierarchical frame aggregation hybrid routing and QoS continuity techniques across the optical wireless interface The book is an essential reference for anyone working on optical fiber access networks wireless access networks or converged FiWi systems **Intelligent Computing** Kohei Arai,2023-08-19 This book is a collection of extremely well articulated insightful and unique state ofthe art papers presented at the Computing Conference which took place in London on June 22 23 2023 A total of 539 papers were received out of which 193 were selected for presenting after double blind peer review The book covers a wide range of scientific topics including IoT Artificial Intelligence Computing Data Science Networking Data security and Privacy etc The conference was successful in reaping the advantages of both online and offline modes The goal of this conference is to give a platform to researchers with fundamental contributions and to be a premier venue for academic and industry practitioners to share new ideas and development experiences We hope that readers find this book interesting and valuable We also expect that the conference and its publications will be a trigger for further related research and technology improvements in this important subject

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