# 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 concumption. 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.

#### LINTRODUCTION

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 eny 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 in appropriate polynomial 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].

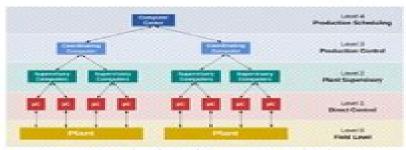


Figure 1: Distributed control system (Source: Wikipedia):

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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 IMDC-SDSP 2020 Raed Abd-Alhameed, Rana Zubo, Obed Ali, 2020-09-09 IMDC SDSP conference offers an exceptional platform and opportunity for practitioners industry experts technocrats academics information scientists innovators postgraduate students and research scholars to share their experiences for the advancement of knowledge and obtain critical feedback on their work The timing of this conference coincides with the rise of Big Data Artificial Intelligence powered applications Cognitive Communications Green Energy Adaptive Control and Mobile Robotics towards maintaining the Sustainable Development and Smart Planning and management of the future technologies It is aimed at the knowledge generated from the integration of the different data sources related to a number of active real time applications in supporting the smart planning and enhance and sustain a healthy environment The conference also covers the rise of the digital health well being home care and patient centred era for the benefit of patients and healthcare providers in addition to how supporting the development of a platform of smart Dynamic Health Systems and self Smart Technologies: Breakthroughs in Research and Practice Management Association, Information management Resources, 2017-06-19 Ongoing advancements in modern technology have led to significant developments with smart technologies With the numerous applications available it becomes imperative to conduct research and make further progress in this field Smart Technologies Breakthroughs in Research and Practice provides comprehensive and interdisciplinary

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International Conference on Computer Networks and Communication Technologies S. Smys, Robert Bestak, Joy Iong-Zong Chen, Ivan Kotuliak, 2018-09-17 The book features research papers presented at the International Conference on Computer Networks and Inventive Communication Technologies ICCNCT 2018 offering significant contributions from researchers and practitioners in academia and industry The topics covered include computer networks network protocols and wireless networks data communication technologies and network security Covering the main core and specialized issues in the areas of next generation wireless network design control and management as well as in the areas of protection assurance and trust in information security practices these proceedings are a valuable resource for researchers instructors students scientists engineers managers and industry practitioners **Guide to Computing Fundamentals in Cyber-Physical Systems** Dietmar P.F. Möller, 2016-04-14 This book presents an in depth review of the state of the art of cyber physical systems CPS and their applications Relevant case studies are also provided to help the reader to master the interdisciplinary material Features includes self test exercises in each chapter together with a glossary offers a variety of teaching support materials at an associated website including a comprehensive set of slides and lecture videos presents a brief overview of the study of systems and embedded computing systems before defining CPS introduces the concepts of the Internet of Things and ubiquitous or pervasive computing reviews the design challenges of CPS and their impact on systems and software engineering describes the ideas behind Industry 4 0 and the revolutions in digital manufacturing including smart and agile manufacturing as well as cybersecurity in manufacturing considers the social impact of the changes in skills required by the Management and Applications of Complex Systems G. Rzevski, S. globalized digital work environment of the future Syngellakis, 2019-03-19 Composed of selected research papers this book brings together new developments and processes for managing complexity The included works originate from renowned complexity thinkers well established practitioners and new researchers in the area of complexity and detail issues of common interest Human Centred Intelligent Systems Alfred Zimmermann, Robert J. Howlett, Lakhmi C. Jain, 2020-05-29 This book highlights new trends and challenges in intelligent systems which play an important part in the digital transformation of many areas of science and practice It includes papers offering a deeper understanding of the human centred perspective on artificial intelligence of intelligent value co creation ethics value oriented digital models transparency and intelligent digital architectures and engineering to support digital services and intelligent systems the transformation of structures in digital businesses and intelligent systems based on human practices as well as the study of interaction and the co adaptation of humans and systems All papers were originally presented at the International KES Conference on Human Centred Intelligent Systems 2020 KES HCIS 2020 held

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Electronics Engineering Namit Gupta, Anjali Gupta, Naresh Purohit, Shiraz Husain, 2025-06-03 The International Conference on Transforming Tomorrow Innovative Solutions and Global Trends in Electrical and Electronics Engineering Pragyata 2025 is scheduled to be held on May 5 6 2025 at Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore Madhya Pradesh India This prestigious event aims to provide a dynamic platform for researchers academicians industry professionals and students to exchange knowledge showcase cutting edge innovations and discuss global trends shaping the future of Electrical and Electronics Engineering Pragyata 2025 will feature sessions and presentations on key emerging areas including Robotics Renewable Energy Smart Grids Mechatronics 5G Communications Artificial Intelligence and the Internet of Things IoT The conference is designed to foster meaningful dialogue cross disciplinary collaboration and engagement with leading experts from academia and industry In line with its theme of Transforming Tomorrow the conference emphasizes clarity innovation and sustainable development It will serve as a catalyst for forward looking discussions and solutions that address modern engineering challenges and contribute to building a smarter greener and more connected world With a commitment to being Concise Clear and Cohesive Pragyata 2025 is set to become a significant academic and professional milestone in advancing technological progress and inspiring future innovation across the Electrical and Electronics Engineering spectrum

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focuses on energy efficiency concerns in IoT and the requirements related to Industry 4 0 It is the first ever how to guide on frequently overlooked practical methodological and moral questions in any nations journey to reducing energy consumption in IoT devices The book discusses several examples of energy efficient IoT ranging from simple devices like indoor temperature sensors to more complex sensors e g electrical power measuring devices actuators e g HVAC room controllers motors and devices e g industrial circuit breakers PLC for home building or industrial automation It provides a detailed approach to conserving energy in IoT devices and comparative case studies on performance evaluation metrics state of the art approaches and IoT legislation

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