IMPLEMETATION OF PLC FOR THECONTROL OF INDUCTION MOTOR

Session 2008-2012

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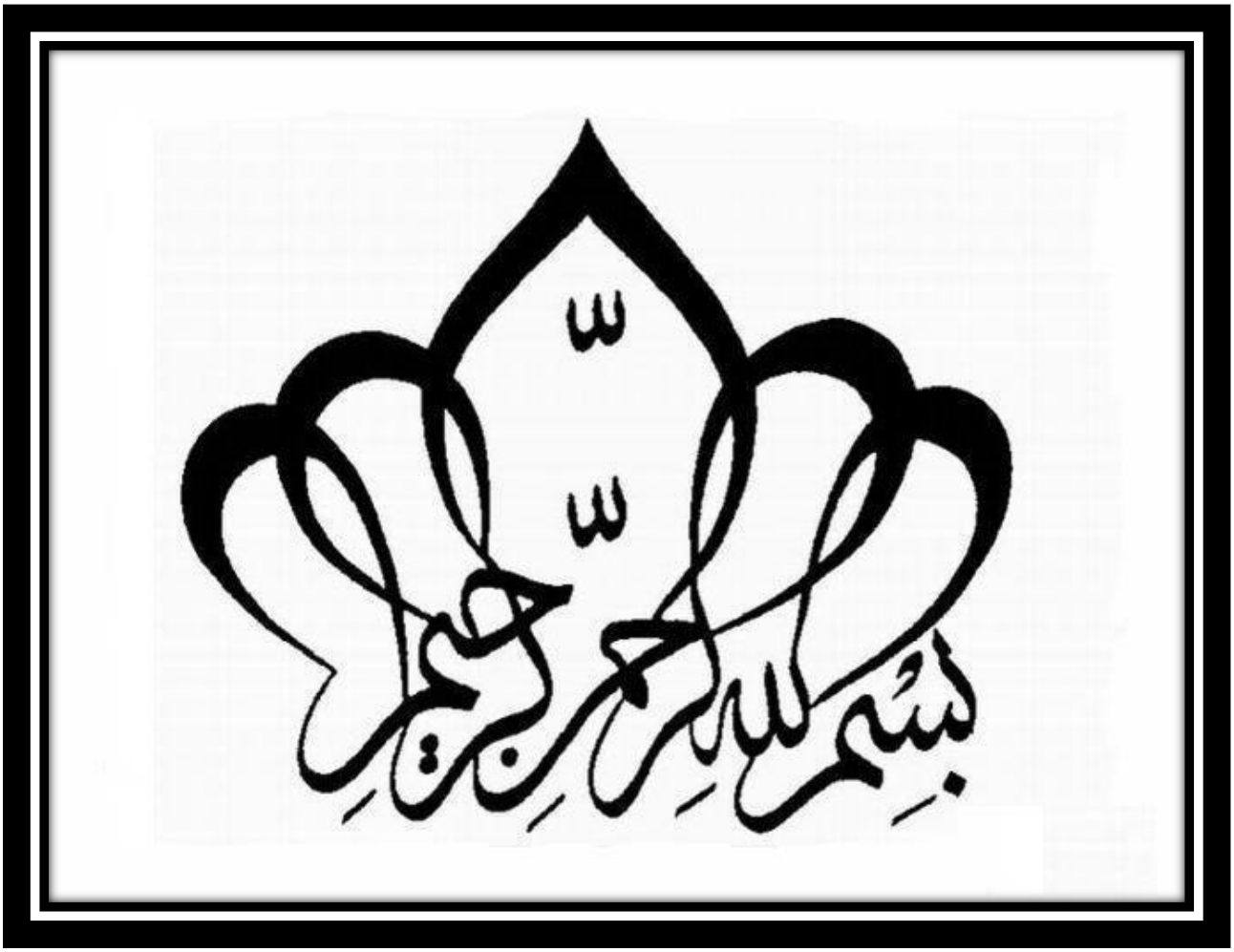
بسم الله الرحمن الرحيم

Dedicated

To

Our Parents

And

Respected Teachers

IMPLEMETATION OF PLC FOR THECONTROL OF INDUCTION MOTOR

A report submitted to the

Department of Electrical Engineering

In partial fulfillment of the requirements for the

Degree

Bachelor of Science

In

Electrical Engineering

By

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September 11, 2012

PREFACE

Acknowledgement

We are thankful to ALLAH ALMIGHTY who blessed us with abilities and helped us during the project and made us able to complete it in a successful manner.

Beneficiaries ought to have the decency to express their gratitude and acknowledgement for the receipt of good things from their benefactors, particularly the knowledge, and the perpetual wealth. So, we are highly indebted to our honorable project advisor Dr. Sajjad Shami, Chairman Department of Electrical Engineering, SST UMT Lahore, for his dedication in bringing us really hardworking students. For his kind and sincere advices, instructions and motivation till accomplishment of our project made us able to have success in our project. We thank him whole heartedly for his noble contribution to our education, project and owe him too with great honor.

At this stage how can we forget to acknowledge our parents who have lost many things in the way of our success and as well as their kindness and prayers which made us successful.

We are also thankful to Mr. Ahmed Osman, Mr. Asif Hussain, Mashood Nasir, and Mr. Muhammad Asim Butt for their guidance to understand the Concept of PWM Inverter and PLC complexities related to project.

Abstract

The use of control systems such as computers to control industrial machinery and processes, replacing human operators, is called Automation. Automation greatly reduces the need for human sensory and mental requirements as well and provides a control without the intervention of human. It provides us the facilities such as moving heavier loads accurately, positioning accurately, moving very fast/slowly, reduced manual handling & improved efficiency. We have implemented Programmable Logic Controller (PLC) for the automation and control of Induction Motor. Programmable Logic Controller is a device that was invented to replace the necessary sequential relay circuits for machine control. It works by looking at its inputs and depending upon their state, turning on/off its outputs. The user enters a program, usually via software, that gives the desired results. Programmable Logic Controller is a user-friendly, microprocessor-based specialized computer that carries out control functions of many types and levels of complexity. Its purpose is to monitor crucial process parameters and adjust process operations accordingly.

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List of Abbreviations

V	*Volts*
A	*Amperes*
PLC	*Programmable Logic Controller*
MOSFET	*Metal Oxide Semiconductor Field Effect Transistor*
IM	*Induction Motor*
SCADA	*Supervisory Control and Data Accusation*
BJT	*Bipolar Junction Transistor*
IGBT	*Integrated Gate Bipolar Transistor*
MW	*Mega Watt*
MMF	*Magneto Motive Force*
AC	*Alternative Current*
DC	*Direct Current*
PIV	*Peak Inverse Voltage*
RMS	*Root Mean Square*
FF	*Form Factor*
RF	*Ripple Factor*
PWM	*Pulse Width Modulation*
HMI	*Human Machine Interfacing*
TTL	*Transistor Transistor Logic*
GSM	*Global System for Mobile*

CHAPTER # 1

Introduction to AC Machines & Automation

1.1. AC Machines

1.1.1. Types of AC Machines

AC Machines are divided into different categories and types with respect to working principle, Rotor construction, winding and etc. More generally these are divided into two major types:

- Synchronous &
- Asynchronous

1.1.2. Synchronous

1.1.2.1. Stepper Motor

A stepper motor is a special type of synchronous motor which is designed to rotate a specific number of degrees for every electric pulse received by its control unit. Pulses are given to the stepper motor through Digital Control System. Stepper motor is also known as stepping motor. Stepper motor basically translates the electrical pulses in mechanical movement.

1.1.3. Asynchronous

1.1.3.1. Induction Motor

An induction or asynchronous motor is a type of AC motor where power is supplied to the rotor by means of electromagnetic induction means it works on the principle of electromagnetic induction.

1.1.3.2. Shaded Pole Motor

It is a type of induction motor however; it is wound different from those of other induction type motors. There is a shading coil placed in the shading slot. The shading coil may be of wound type or it may be a solid piece of copper placed around the shaded portion of the pole. [1]

1.2. Automation

Automation is the use of control systems and information technologies to reduce the need for human working the production of goods and services in general usage, automation can be defined as a technology concerned with performing a process by means of programmed commands combined with automatic feedback control. [2]

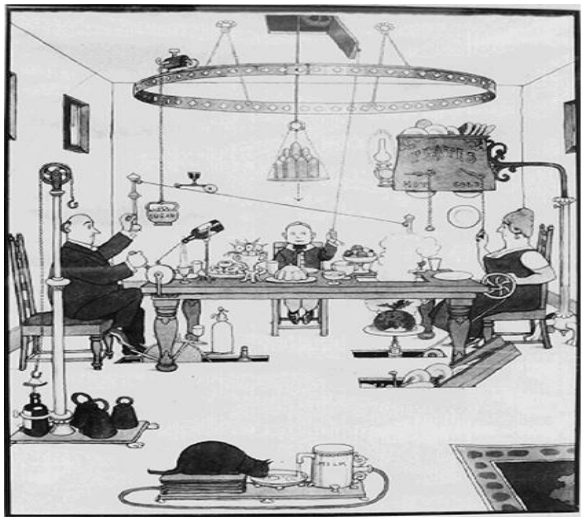

Figure1. 3: Simple View of Automation [2]

1.2.1. Automation Process

The fundamental constituents of any automated process are

- Power Source
- Feedback control mechanism
- Programmable command structure

Programmability does not necessarily imply an electronic computer. For example, the Jacquard loom, developed at the beginning of the nineteenth century, used metal plates with holes to control the weaving process. Nonetheless, the advent of World War II and the advances made in electronic computation and feedback have certainly contributed to the growth of automation. While feedback is usually associated with more advanced forms of automation, so-called open-loop automated tasks are possible. Here, the automated process proceeds without any direct and continuous assessment of the effect of the automated activity. For example, in an automated car wash we cannot say that how much car is cleaned, so there is no final answer.

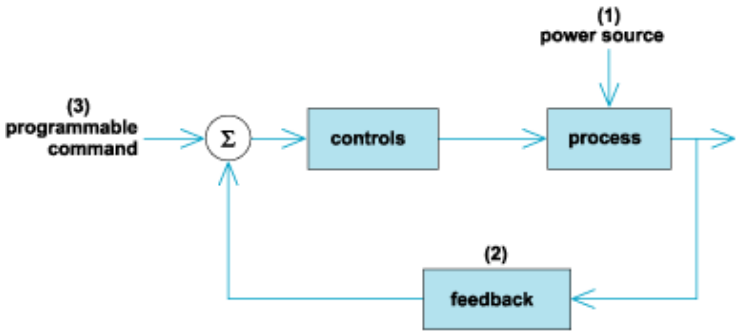

Figure1. 4: Elements of an automated system [2]

Because of the growing ubiquity of automation, any categorization of automated tasks and processes is incomplete. Nonetheless such a categorization can be attempted by recognizing two distinct groups.

1.2.1.1. Automated Manufacturing

Automated manufacturing includes automated machine tools, assembly lines, robotic assembly machines, automated storage-retrieval systems, integrated computer-aided design and computer-aided manufacturing (CAD/CAM), automatic inspection and testing, and automated agricultural equipment (used, for example, in crop harvesting).

1.2.1.2. Automated Information Processing and Control

It includes automatic order processing, word processing and text editing, automatic data processing, automatic flight control, automatic automobile cruise control, automatic airline reservation systems, automatic mail sorting machines, automated planet exploration (for example, the rover vehicle, on the Mars Pathfinder mission), automated electric utility distribution systems, and automated bank teller machines. [3]