

CHAPTER ONE

INTRODUCTION

1.1 General

Programmable logic controllers, also called programmable controllers or PLCs, are solid-state members of the computer family, using integrated circuits instead of electromechanical devices to implement control functions. They are capable of storing instructions, such as sequencing, timing, counting, arithmetic, data manipulation, and communication, to control industrial machines and processes [1].

A Parking Availability and Gate Control System is a number of components working together, usually a Parking Availability data which is designed to assist a driver to reach the suitable slot. The parking availability system will indicate whether there is any unoccupied parking slot available in the parking area. It performs the same task as a traditional parking, but attempts to do so faster and more accurately.

HMI Screens are typically used to monitor and control industrial processes. Serving as the primary interface between a human operator and the machine or machines being operated, HMI screens can be found in factories, refineries, water treatment plants, subway systems - anywhere there is a need to visual real-time operational data [2].

HMI will guide drivers to enter the parking area depending on the availability of the parking area or not.

1.2 Problem Statement

Finding a parking place is becoming a challenge, especially in big cities and popular destinations.

The classical Parking and Gate Control has faced many problems such as needed large area, accuracy, more wiring connection, low level of safety, maintenance of mechanical equipment, low response for executing the orders and a long time to park cars.

1.3 Objectives

The main aims of this study are to:

- Design a parking availability & gate control system.
- Implement of the parking availability & gate control system using the PLC and HMI software.
- Build a physical model consists of two floors (6 cars).

1.4 Methodology

- Use the ladder diagram language to program the PLC and HMI software to implement the model, the software will scaled up to reach the capacity of 6 cars and build a physical model consist of two floors (6 cars).
- Use the SIMATIC S7-300 PLC to control the gate system according to the parking availability depends of the feedback sensors to indicate the presence of a car.
- Simulate Parking Availability and Gate Control system using WinCC flexible 2008 software.
- Use the human machine interface (HMI) software to guide the driver, start and stop system and it's tell him about the parking area condition.

1.5 Layout

This thesis consists of five chapters:

Chapter One gives an introduction and problem statement. It also presents the objectives and methodology of this study.

Chapter Two presents literature review and theoretical background of Parking Availability and Gate Control System, programmable logic controller, human machine interface and sensors. It gives types, components, histories and details of the Parking Availability and Gate Control System, programmable logic controller and human machine interface and sensors. It gives the relation between Parking Availability and Gate Control System.

Chapter Three focuses on the system descriptions, components, programming and wiring. It gives the structures of parking consist of 6 slots, entrance, exit gate, wiring diagrams, a physical model for the parking of two floors (6 cars), the HMI software and interface between PLC and HMI.

Chapter Four deals with the system simulations and implementations. It gives the simulation of parking consists of 6 slots and the implementation parking.

Chapter Five draws the conclusions and recommendations.