معهد التكنولوجيا التطبيقية

INSTITUTE OF APPLIED TECHNOLOGY

PLC

Module 6
Project

PREPARED BY

IAT Curriculum Unit

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Module 6: Project

Module Objectives

Upon successful completion of this module, students should be able to:

1. Demonstrate understanding of simple PLC control applications.
2. Identify the major control elements of the application.
3. Give an example of a PLC control application, state the inputs and outputs and define the control elements.
4. Develop and implement a simple PLC control application.

Module Contents:

6.1 Introduction

During earlier days, the traditional automated industrial production lines consisted huge electrical boards for system controls, and they included a number of interconnected electromechanical relays and complicated wiring which made the whole system work. Whenever such control systems stopped functioning, finding errors or troubleshooting was a hard process. During such cases, the systems had to be literally disabled in order to fix the errors. This meant that the entire production staff in that line of production had to be out of work until the system was fixed again.

The Programmable Logical Controller (PLC) Technology has overcome all the traditional problems and it has also increased systems functionality, reliability and durability.

In this module, students are required to build a simple PLC project using his imagination and creativity. The project specifications listed in the module are the minimum requirements, and the students are free to modify or add more to the specified design.

6.2 Project 1 : Industrial Gate

Automatic gates and doors are widely used in many places starting from doors of supermarkets, lifts, banks, etc. to more important applications like parking gates.

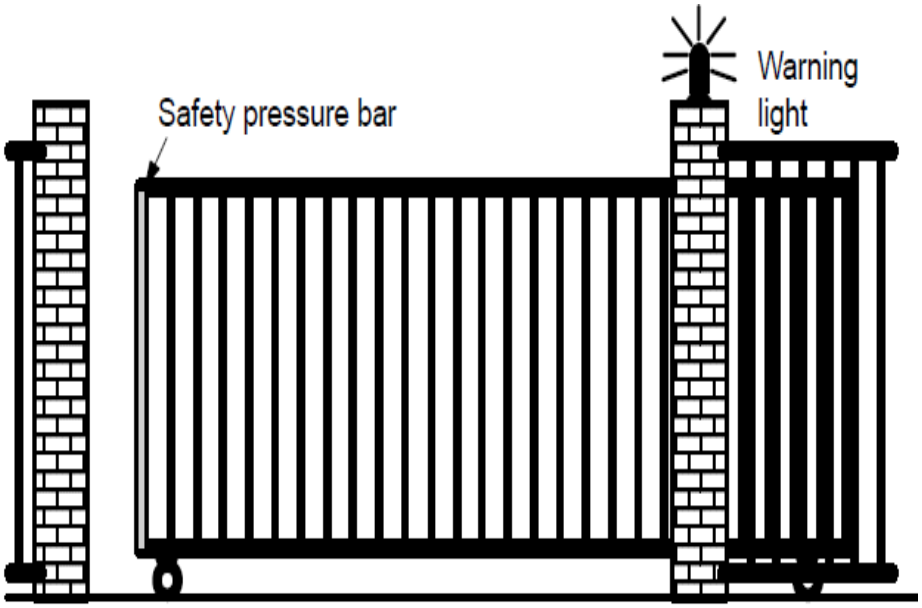

Figure 6.1 Industrial gate

Specifications of the Gate Control System

1. The gate must be opened and closed by operating a pushbutton.
2. The person at the gate should also have control on operation of the gate at the same time.
3. The gate must be normally fully opened or closed. However, the gate motion can be interrupted at any time by emergency stop switch.
4. A flashing light needs to be activated 5 seconds before the gate begins to move, and continues for as long as the gate is in motion.
5. A safety pressure bar (or a limit switch) needs to be included in order to prevent harm to persons and objects from getting trapped or damaged when the gate closes.

Required Components/Parts

List the required components/parts.

PLC Inputs and Outputs:

List all the inputs/outputs used in the system and assign a PLC input or output for each one.

Parts	Input/output	Assigned PLC I/O

PLC Ladder Program

Draw a PLC ladder diagram to achieve the desired functions.

6.3 Project 2 : Service Water Pump

The use of rainwater as an addition to the drinking water supply is gaining importance in the domestic housing area. This saves money and helps protect the environment. For example, rainwater can be used for:

- Washing clothes
- Irrigation system for gardens
- Watering indoor plants
- Car wash
- Toilet flushing installations

The figure below illustrates how such a rainwater utilization system is operated:

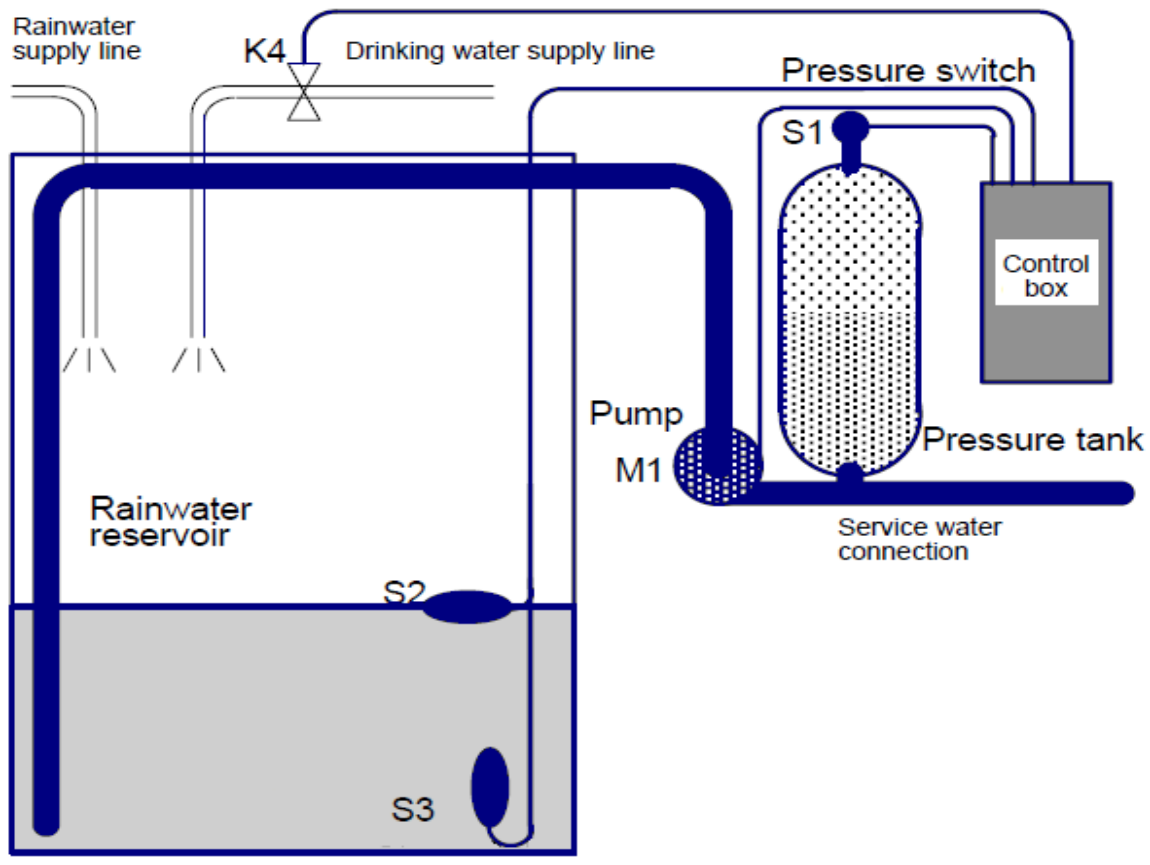

Figure 6.2 Service water pump

Initially, the rainwater is collected in a reservoir. A pumping station, then, supplies service water that can be used later as a drinking water.

Specification of the Service Water Pump System

The required control is to program the PLC to do the following:

1. The system must be capable of supplying service water at all times (Pump M1).
2. Pump M1 must stop in 2 cases:
   a- the tank is empty (sensed by S3).
   b- high pressure in the pressure tank (sensed by S1).
3. If water level is too low (sensed by S3) the drinking water supply line opens (K4), then stops when water level is at the maximum (sensed by S2)

Required Components/Parts.

List the required components/Parts

PLC Inputs and Outputs:

List all the inputs/outputs used in the system, and assign a PLC input/output for each one

Part and Purpose	Input/output	Assigned PLC I/O

PLC Ladder Program

Draw a PLC ladder diagram to achieve the desired functions.

6.4 Assignment

Visit your **classroom Blog** created by your instructor and comment on the following topics:

Ever thought about automating your existing garage door to make it open automatically once your car approaches it? What parts are required to implement such a system?

If you are to design this system, what specifications would you consider in your design?

Tell your friends what additional enhancements could be added to the system?