19/20

Princess Sumaya University for Technology

King Abdullah II Faculty of Engineering

Computer Engineering Department

MICROPROCESSORS & EMBEDDED SYSTEMS

PROJECT PROPOSAL

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Project Introduction

Title

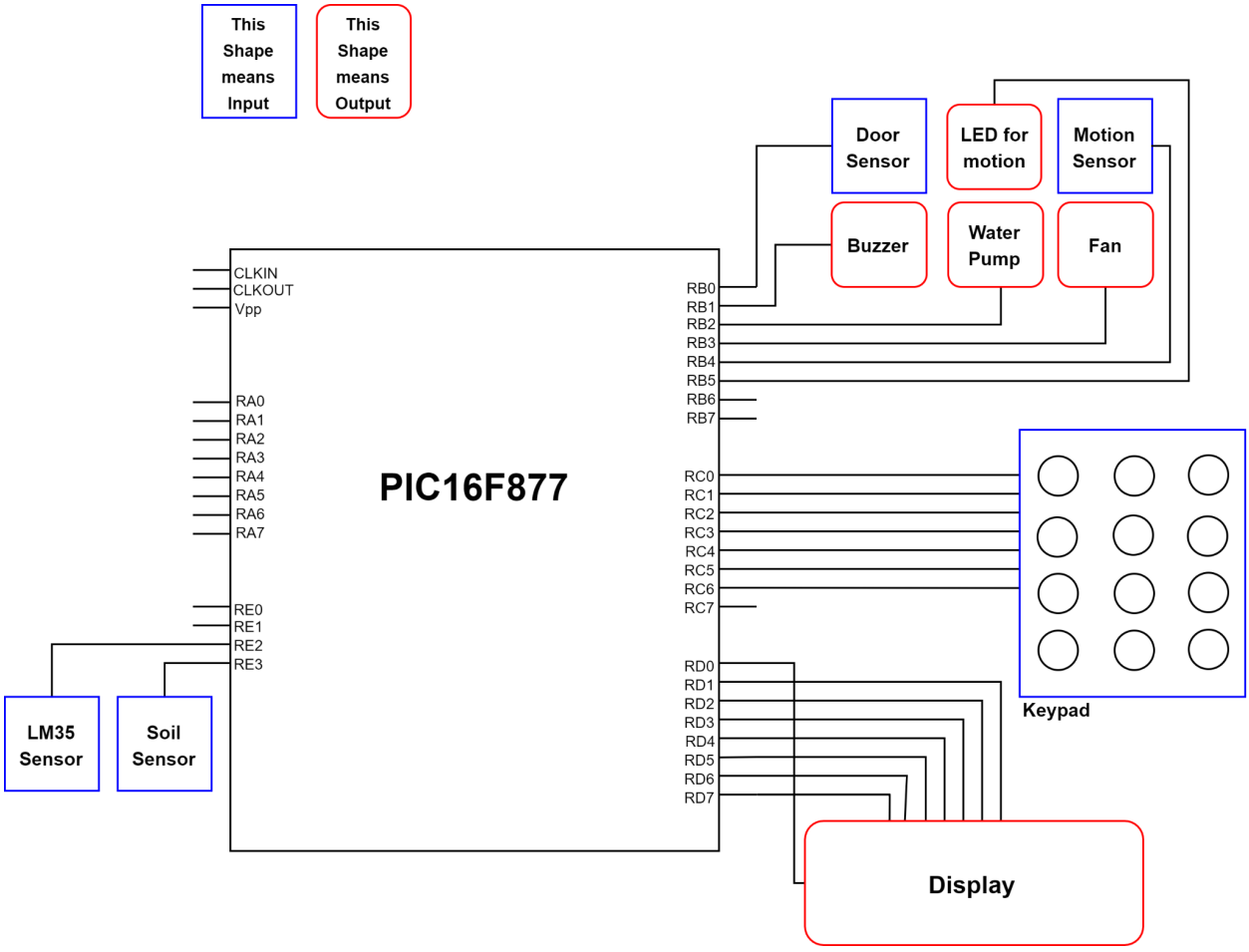
Our project's title will be "Simulation of a Smart Home Controller".

Description

This is a control system that utilizes the "PIC 16f877" microcontroller, to achieve automated management of different aspects of a house, temperature control of the house, watering the garden, while introducing some handy features that the residents can make use of, energy saving through smart garage lights, an anti-burglar security system, and a user interface to view the sensor readings and toggle these systems on and off. The interface will also be password protected to ensure unauthorized access is prohibited.

Build Overview

Block Diagram



Component List and Functionality

We will be using the following components:

1. PIC 16f877 microcontroller: main controller of the system.
2. Keypad: used to interact with the user to enter the pin, and toggle the systems.
3. Display: shows informative messages, as well as the sensor readings.
4. Door sensor: a sensor that triggers when the door is open.
5. Buzzer: indicate opening of the door when the security system is active.
6. Soil moisture sensor: keeps track of the soil's moisture to know when it gets dry.
7. Water pump (DC motor): turns on to water the garden when the soil is dry.
8. Relays: to control the motors using PIC
9. Temperature sensor (LM35): keeps track of the room temperature.
10. Fan: turns on when the temperature gets too hot.
11. Motion sensor (PIR): detects the car motion when parking to control the lights.
12. LEDs: Garage lights that turn on when motion in the garage is detected.

Input/Output Ports

Pin	State
RE2 – RE3	Analog Input
RB0	Digital Input
RB4	Digital Input
RC0 – RC6	Digital Input
RB1 – RB3	Digital Output
RB5	Digital Output
RD0 – RD7	Digital Output

Program Overview

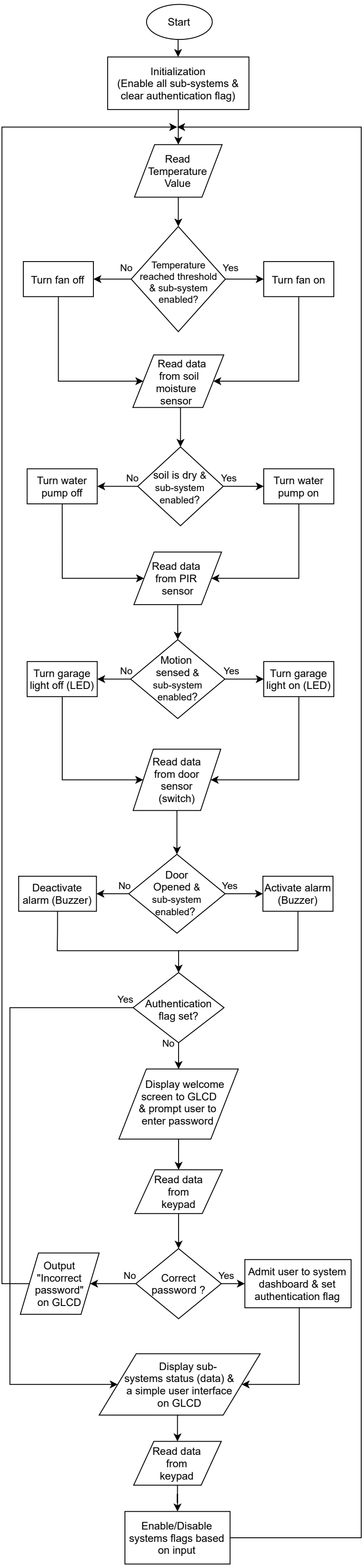
Flow Diagram

The flow diagram of the system behaviour will be appended to the end of the report.

Bibliography

Wilmshurst, T. (2009). Designing Embedded Systems with PIC Microcontrollers: Principles and Applications (2nd ed.). Newnes.

Flow Chart:


Start
Initialization (Enable all sub-systems & clear authentication flag)
Read Temperature Value
Temperature reached threshold & sub-system enabled?
No
Yes
Turn fan off
Turn fan on
Read data from soil moisture sensor
soil is dry & sub-system enabled?
No
Yes
Turn water pump off
Turn water pump on
Read data from PIR sensor
Motion sensed & sub-system enabled?
No
Yes
Turn garage light off (LED)
Turn garage light on (LED)
Read data from door sensor (switch)
Door Opened & sub-system enabled?
No
Yes
Deactivate alarm (Buzzer)
Activate alarm (Buzzer)
Authentication flag set?
Yes
No
Display welcome screen to GLCD & prompt user to enter password
Read data from keypad
Correct password ?
No
Yes
Output "Incorrect password" on GLCD
Admit user to system dashboard & set authentication flag
Display sub-systems status (data) & a simple user interface on GLCD
Read data from keypad
Enable/Disable systems flags based on input