EMERTXE TRAINING PROJECT DOCUMENTATION FRAMEWORK

REQUIREMENTS & DESIGN DOCUMENT

Emertxe Information Technologies (P) Ltd

Microcontroller-Based Washing Machine Simulation Using PicsimLab

VERSION: 0.1

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1 Overview

1.1 Purpose

This project focuses on simulating a washing machine using PicsimLab, aiming to replicate real-world washing machine functionality in a virtual environment. The project begins with a comprehensive understanding of washing machine components, cycles, and operations. Parameters defining laundry status, such as fabric type, load size, and water level, are identified.

1.2 Scope

This simulation project provides valuable insights into washing machine operations, control system design, and simulation techniques. Participants gain practical experience in applying algorithms to simulate intelligent appliances, contributing to a better understanding of laundry automation.

2 Assumptions, Dependencies, Constraints

2.1 Assumptions

All the peripherals are simulated and no real time objects are interfaced .

2.2 Dependencies

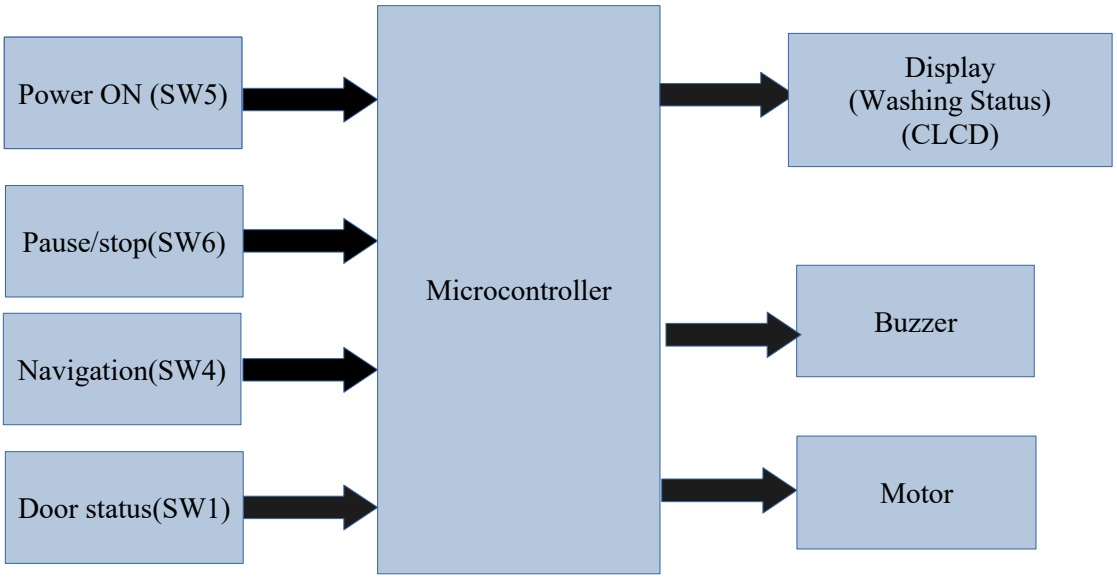
None

2.3 Constraints

None

3 Requirements

3.1 Functional Requirements



3.1.1 Power ON Screen

Description : As soon as board is reset , print “Press key5 to Power ON Washing machine” on the CLCD.

wait till SW5 is pressed, if SW5 is pressed Print “Powering ON Washing Machine”.

Requirement No	1 – POWER ON SCREEN
Description	Inputs – SW5
	Process – wait till SW5 is pressed, Turn ON the machine
	Output – Print “Powering On Washing Machine”

3.1.2 Washing Program Screen

Description : The Washing Program menu will contain the following washing options.
→ Daily, Heavy , Delicates, Whites, Stain wash , Eco cottons, Woolens , Bed sheets, Rinse+Dry , Dry only, Wash only , Aqua store.
Using the keypad SW4 we can scroll between the options available. A long press of SW4 will select the option highlighted with *

Requirement No	2 – Washing Program Screen
Description	Inputs – SW5 and SW4
	Process -Washing Program selection and navigation
	Output - The Washing Program menu will contain the following displays → Daily, Heavy , Dedicates, Whites, Stain wash , Eco cottons, Woolens , Bed sheets, Rinse+Dry , Dry only, Wash only , Aqua store Washing Programs *Daily Heavy Delicates using the keypad SW4 we can scroll between the options available. A long press of SW4 will select the option highlighted with *, switch to the Water level screen.

3.1.3 Water Level Screen

Description : This screen should allow the user to select water level. The water level menu will contain the following displays
→ Auto, Low, Medium, High, Low
Using the keypad SW4 we can scroll between the options available. A long press of SW4 will select the option highlighted with *

Requirement No	3 – Water level screen
Description	Inputs - SW4
	Process – Water level selection and navigation
	Output - The water level menu will contain the following displays → Auto, Low, Medium, High, Max Water Level: *Auto Low Medium using the keypad SW4 we can scroll between the options available. A long press of SW4 will select the option highlighted with *, switch to start and stop screen

3.1.4 Start Screen

Description : Once washing program and water level is selected, provide user option to start the machine.
If SW5 is pressed, start the machine, display the function selected and time taken.
Then switch to function screen

Requirement No	4 – Start Screen
Description	Inputs – SW5, SW6
	Process – To Start the operation selected
	Output – Display Press Switch : SW5: START SW6: STOP Once SW5 is pressed , display the function selected and time. switch to function screen

	If SW5 is pressed , display the function selected and time. switch to function screen Prog: Heavy Time: 00:50 If SW6 is pressed , go back to washing program screen.

3.1.5 Function Screen

Description : Once machine started , display the function on going , it can be wash, rinse or spin. Along with display the time left on the CLCD.

Requirement No	5 – Function Screen
Description	Inputs - SW1 , SW5 , SW6.
	Process – Display the function and time left
	Output - Display the function and the time left function : wash , rinse , spin. Time : based on washing program and water level, set time. If SW5 is pressed start the washing machine if SW6 is pressed pause the washing machine Function - wash TIME : 00:50 SW5 : START SW6 : PAUSE The status of SW1 is indicative of the door status. When the switch is pressed, it signifies that the door is open; conversely, when the switch is not pressed, it indicates that the door is closed." If SW1 is pressed turn ON the buzzer and display, DOOR : OPEN

	Please close

3.1.6 Completion Status Screen

Description : once all programs are completed, display notification “ Program completed
Remove clothes ” on the CLCD.

Requirement No	1 – Completion screen
Description	
	Output – Print “ Program completed Remove clothes”

4 Output images

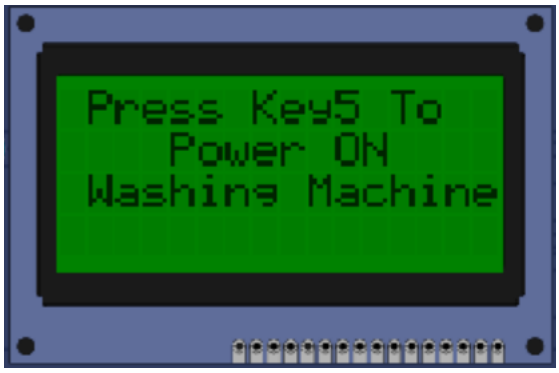


Fig1 .POWER ON SCREEN

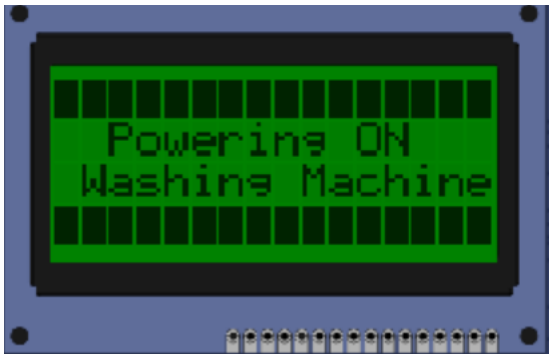


Fig 2. POWERING ON SCREEN

Fig 3. WASHING PROGRAM SCREEN

Fig 4. WATER LEVEL PROGRAM

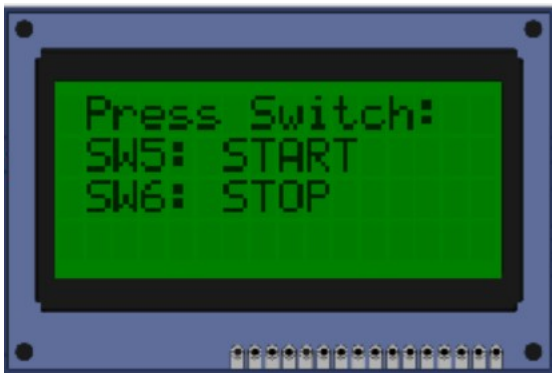


Fig 5 .START SCREEN

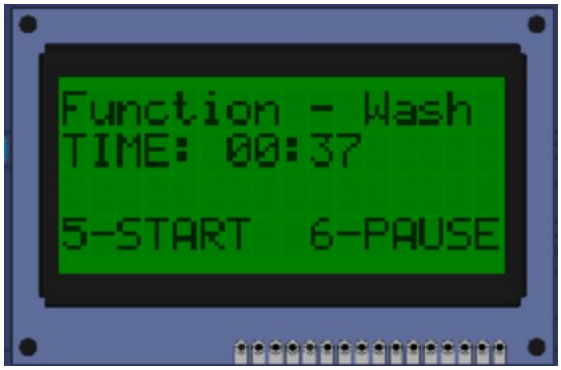


FIG 6 : FUNCTION SCREEN

FIG 7: DOOR STATUS SCREEN

FIG 8: PROGRAM COMPLETION STATUS

Conclusion :

The washing machine simulation using picsimlab served as an effective tool for learning and applying concepts in embedded systems. It offered a hands-on experience that complemented theoretical knowledge and provided a foundation for further exploration in the field of automation and control systems.