



WASHING MACHINE SIMULATION

Project Presented By:

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C-Programming

- C Program is used in System Software Development, Embedded Software Development, OS Kernel Development, Firmware, Middle-ware and Driver Development, File System Development and many more.
- C-used effectively in various specific domains and it is a free-formatted language and efficiency and portability.
- Number systems-Decimal, Octal, Hexadecimal, Binary
- Data representation-bit, byte, word
- Integrated number-positive, negative
- Data-type-integral(Char, int), Floating point(float, double)

CONDITIONAL CONSTRUCTS:

- Single iteration-if, if else, if else if and switch case
- Multiple iteration-while, do while, for
- Unconditional-continue, break

Learnt from Embedded C

- Operators-Operates on its Operands, Returns a value
- Array-collection of data of same data type. Address are sequential.
- Pointer-parameter passing mechanism in function, by passing the reference
- Function-Pass by Value and Pass by reference(Return more than one value from a function), Passing array, returning array and recursive.
- Strings-Contiguous Sequence of characters, easily stores ASCII and its extensions.
- Storage class-auto, register, static local, static global and extern.

Micro Controller

- An Integrated Circuit which is capable of being programmed to perform a specific task.
- All components in single chip, less flexible, Less design complexity.
- Things to be noted when choosing microcontroller:-
 - Application
 - Performance, Price
 - Availability of Tools
 - Special Capabilities

MICROPROCESSOR:

- A microprocessor is a computer processor wherein the data processing logic and control is included on a single integrated circuit, or a small number of integrated circuits.
- All separate components, More flexible, More design complexity.

EMBEDDED SYSTEMS

- Any combination of Hardware and Software which is intended to do a specific task can be called as an Embedded system.
- Categories-Stand-alone-Real Time, Networked, Mobile
- Challenges in ES-Efficient Input/output, Embedding an OS, Code Optimization Testing and Debugging.

Real Time Aspects:

- **Hard Real Time**— Should meet its deadline Life Critical Application.
- **Firm Real Time** – Similar to Hard Real Time.
- **Soft Real Time**- Can have tolerance in meeting its deadline.

Installation of Software and LED

- We have Installed the following software's.
 - MPLAB X IDE
 - Picsim Lab
 - Xc8 compiler

Interfaces LED's Introduction:

- Simplest device used in most on the embedded application as feedback, works just like diodes.

LED basic program demo:

- Basic LED program-Toggling LED's connected to port B(PIC16F877A).
- Build hex file in mplab x ide software then in picsim lab software load the hex file in.
- Board-pic genios board.
- Microcontroller-PIC16F877A.

MPLAB X IDE

- MPLAB X IDE is an expandable, highly configurable software program that incorporates powerful tools to helps you discover, configure, develop, debug and qualify embedded design for most of our microcontroller and digital signal controllers.
- MPLAB supports project management, editing, debugging and programming of Microchip 8-bit, 16-bit and 32-bit PIC microcontrollers. It only works on Microsoft Windows.
- MPLAB is a proprietary freeware integrated development environment for the development of embedded applications on PIC and dsPIC microcontrollers, and is developed by Microchip Technology.

PICSIM LAB

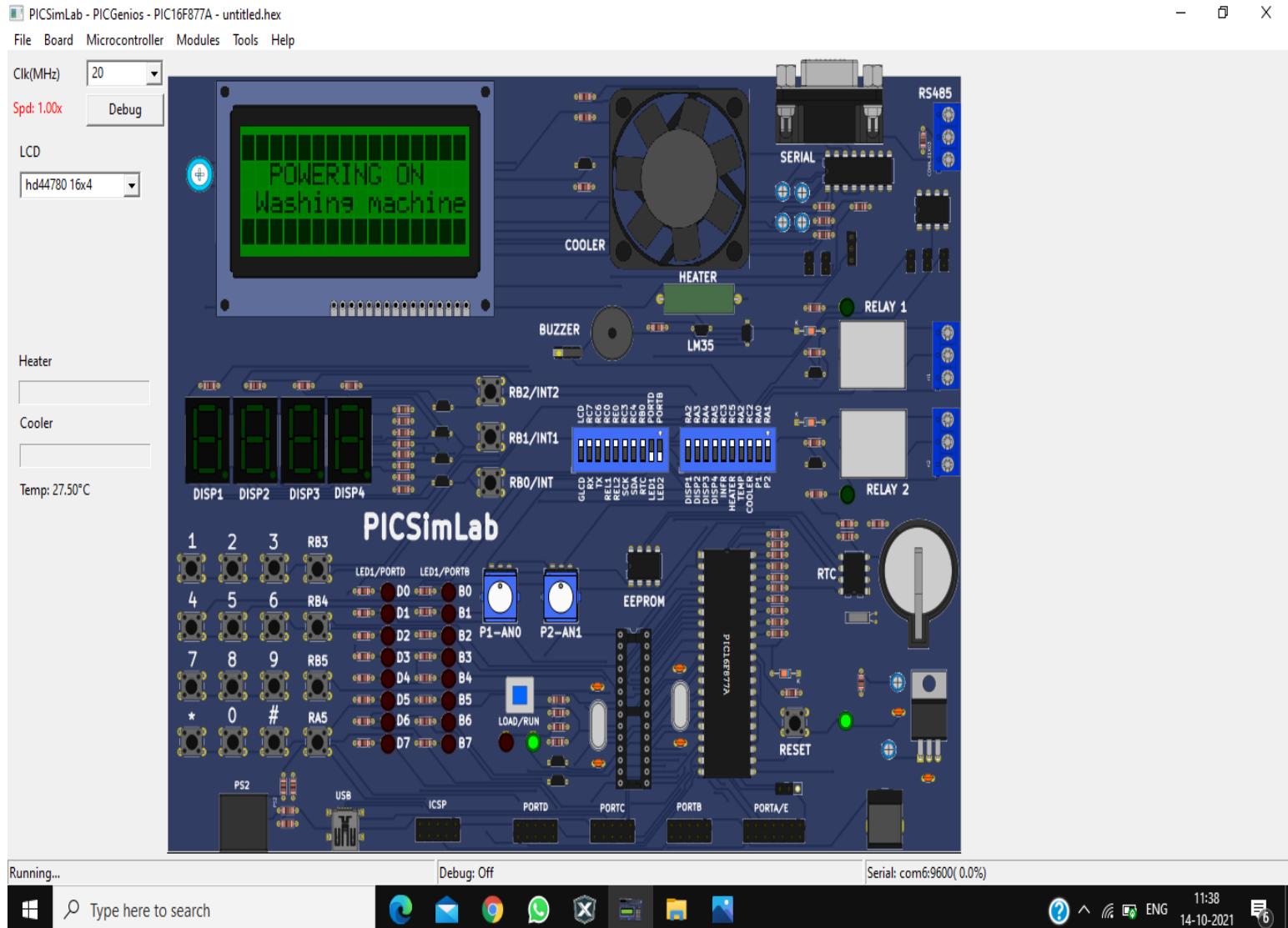
- PicsimLab is a real-time emulate of development boards with integrated MPLABX/avr-gdb debugger. For code editing and debugging the same tools used for a real board should be used with PicsimLab, such as MPLABX or Arduino IDE.

Xc8 COMPILER

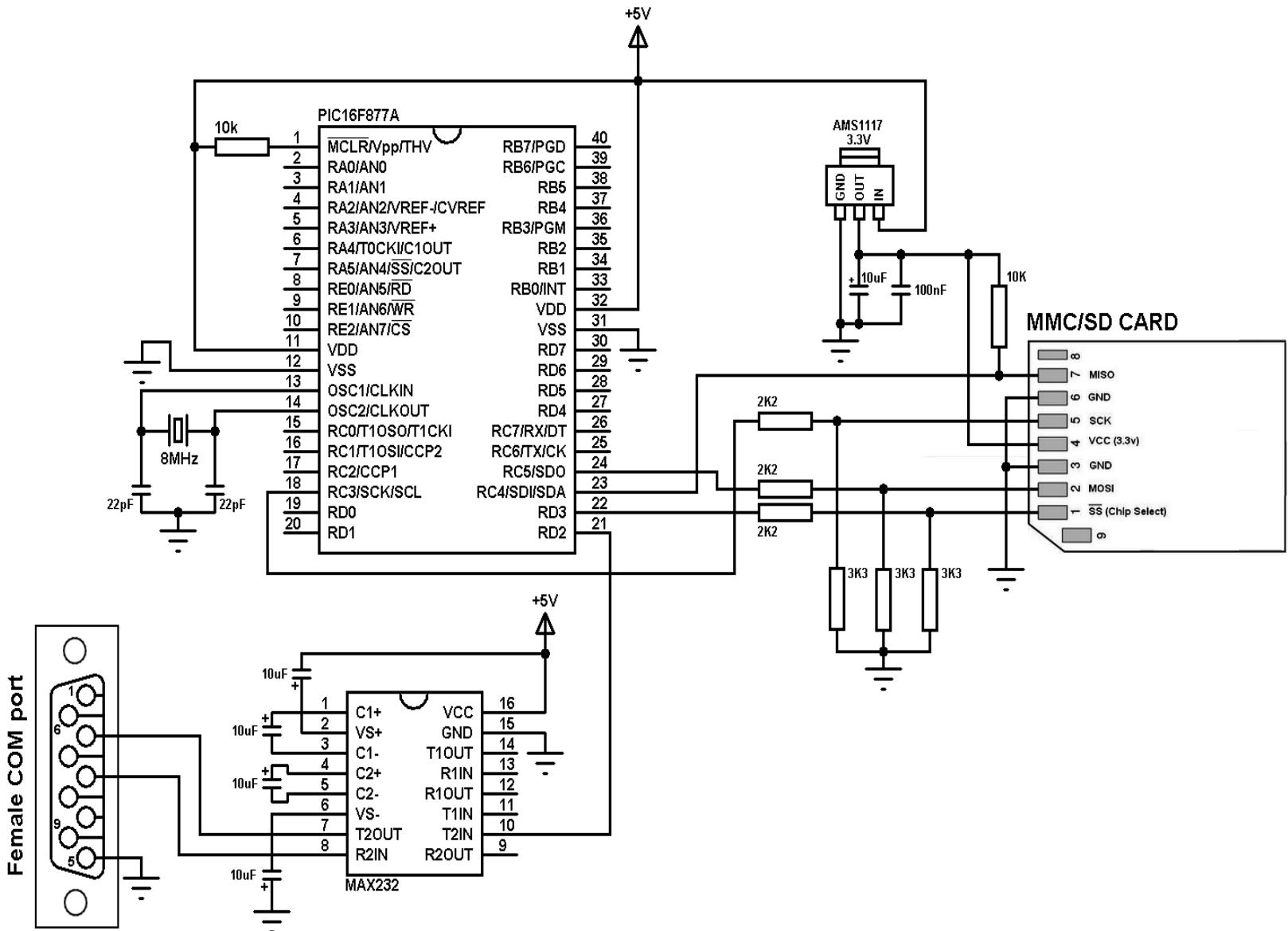
- Xc8 is a C compiler from Microchip for 8-bit PICs. Both programs run on windows, Max OS X, and Linux.

PICGenios-PIC16F877A

- The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an LCD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital converter, 2 capture/compare/PWM function, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI) or the 2-wire Inter-Integrated.
- PIC16F877A is a 40-pin PIC Microcontroller, designed using RISC architecture, manufactured by Microchip and is used in Embedded Projects. It has five Ports on it, starting from Port A to Port E. It has three Timers in it, two of which are 8-bit Timers while 1 is of 16 Bit.



PIC16F877A BOARD



PIC16F877A BOARD ARCHITECTURE

CLCD

- CLCD=>Character Liquid Crystal Display.
- It has two type of display, they are 16*2 and 16*4.
- Used to display all ASCII character and symbol It has totally 16 interfacing lines.
- D0 to D7 are data transfer line. That controller can execute the Instruction and data.
- RS line – REGISTER SELECT LINE.
 - RS value is 1-> Data...
 - RS value is 0->Instruction...

DATA PROCESSION IN CLCD

- Data Processed by two methods
- Delay Method
- Poll D7 method
- In Poll D7 Method, we want to continuously monitor D7. In data lines, we are providing data.
- R/W=1=>Read.
- R/W=0=>Write.
- In R/W pin is permanently grounded, that means only write an data.
- In CLCD, D0 to D7 are connected to PortD & RS and Enable pin are connected to PortE.
- 8 bit->D0 to D7.
- 4bit->D4 to D7.
- Enable pin act as indicator by apprising LCD about the inception of data transmission by the microcontroller.

TACTILE SWITCHES

- In matrix keypad, we need to configure ROWS as OUTPUT & COLUMNS as INPUT.
- When designing pull down interface, R1 is 10 times greater than R2. $[R1>10R2]$.

TIGGERING METHODS:

- Edge trigger.
- Level trigger.

Bouncing Effect:

- There is a metal plate and terminal. Spurious pulse detection while pressing /releasing the tactile switch is called bouncing effect.

MATRIX KEYPAD

- Used when the more number of user inputs is required and still want to save the controller I/O lines.
- Uses row and columns concept.
- Most commonly used in Telephone, digital lockers and calculators many more.
- In the cooking mode the matrix keypad keys are used to select the respective modes.

Tactile Keyboard:

- A key switch is tactile if it has a bump in its response to finger pressures at or near the engagement point where the key press registers and before the key bottoms out at the end of its travel. A keyboard is tactile if it made with tactile key switches.

TIMERS

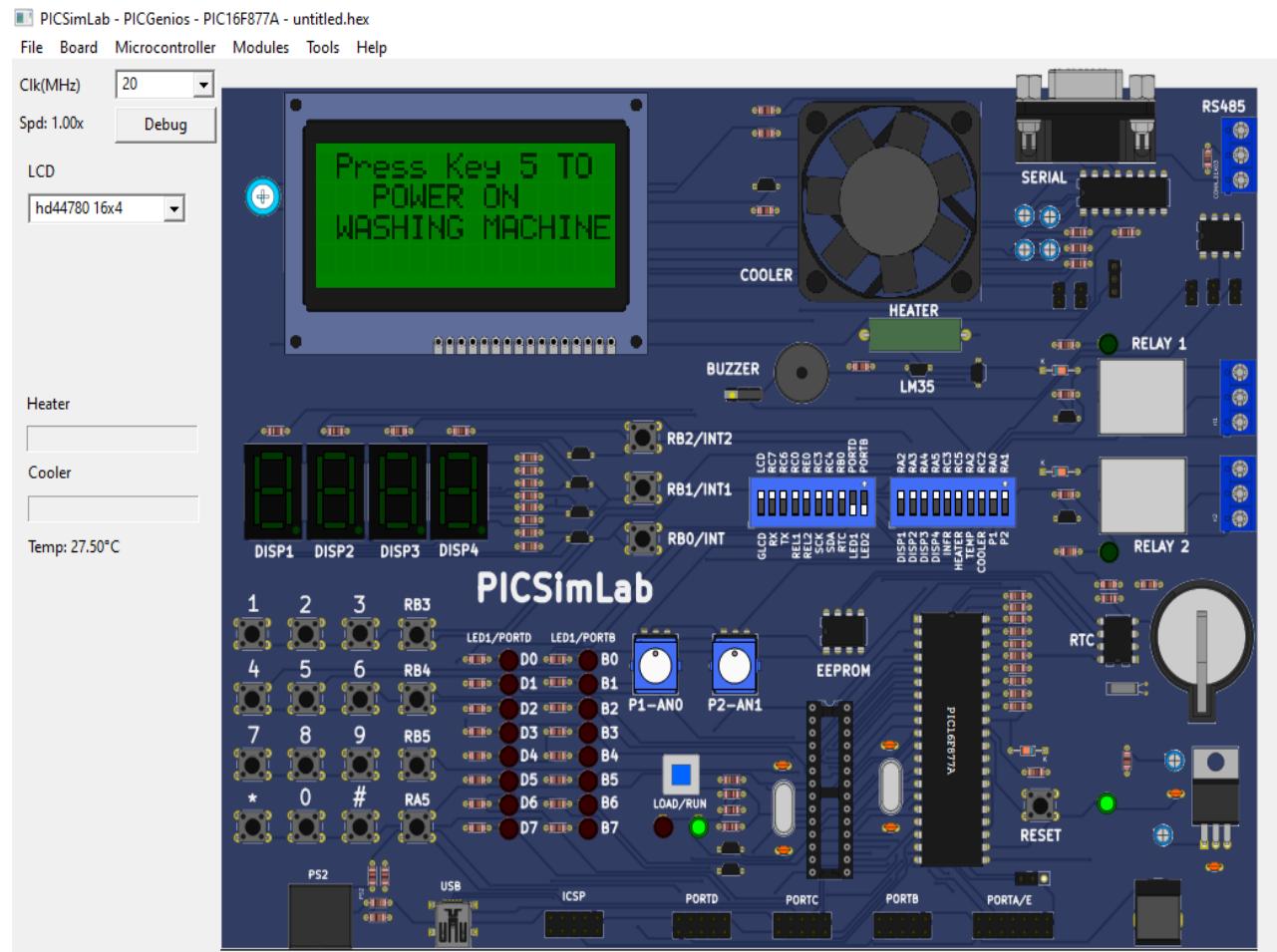
- It has three modes like:
 - 1) PWM or pulse generator
 - 2)Counter.
 - PW or PP measurement etc.,

- Tick—>Up count or down count
- Quantum->System clock setting
- Scaling->Pre or post
- Resolution->register width.

- The micro mode and grill mode are under the operational mode.
- And the timer is set with Matrix key pas * to clear and # to enter.
- To toggle the LED 8 bit resolution is required.



WASHING MACHINE SIMULATION USING PICSIMLAB SOFTWARE



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search



? ^ ENG 14-10-2021 11:38

Powering on of washing machine

File Board Microcontroller Modules Tools Help

Clk(MHz) 20

Spd: 1.00x

Debug

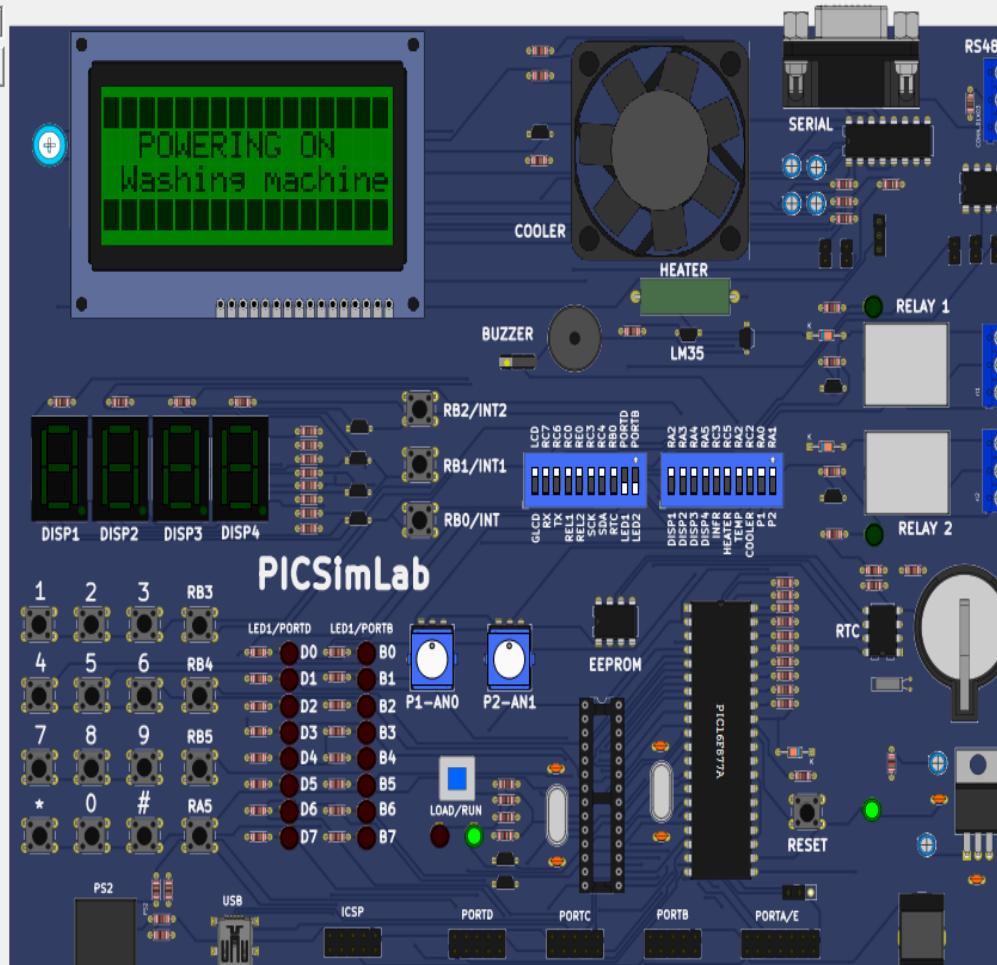
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search

11:38
14-10-2021

Washing Machine is in ON mode

File Board Microcontroller Modules Tools Help

Clk(MHz) 20

Spd: 1.00x Debug

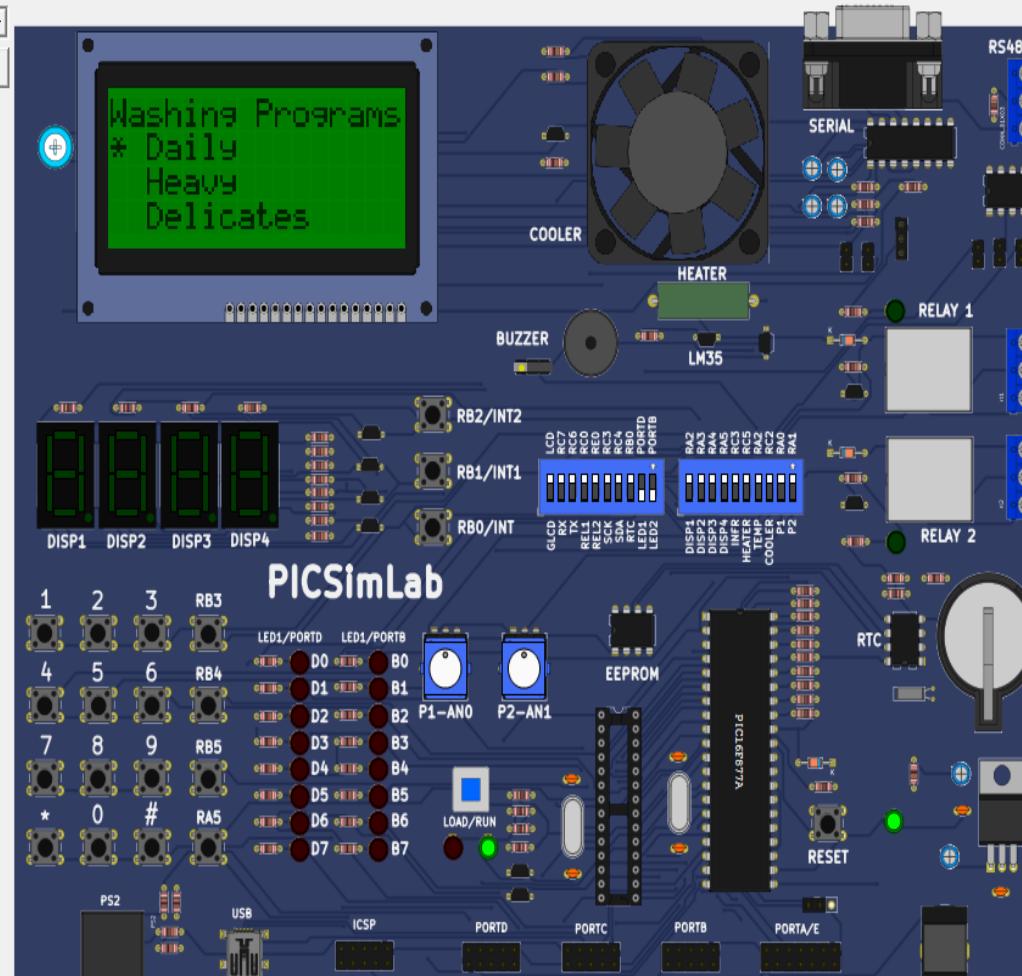
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search

11:38
14-10-2021 ENG 6

Select the Washing Program

Clk(MHz)

20

Spd: 1.00x

Debug

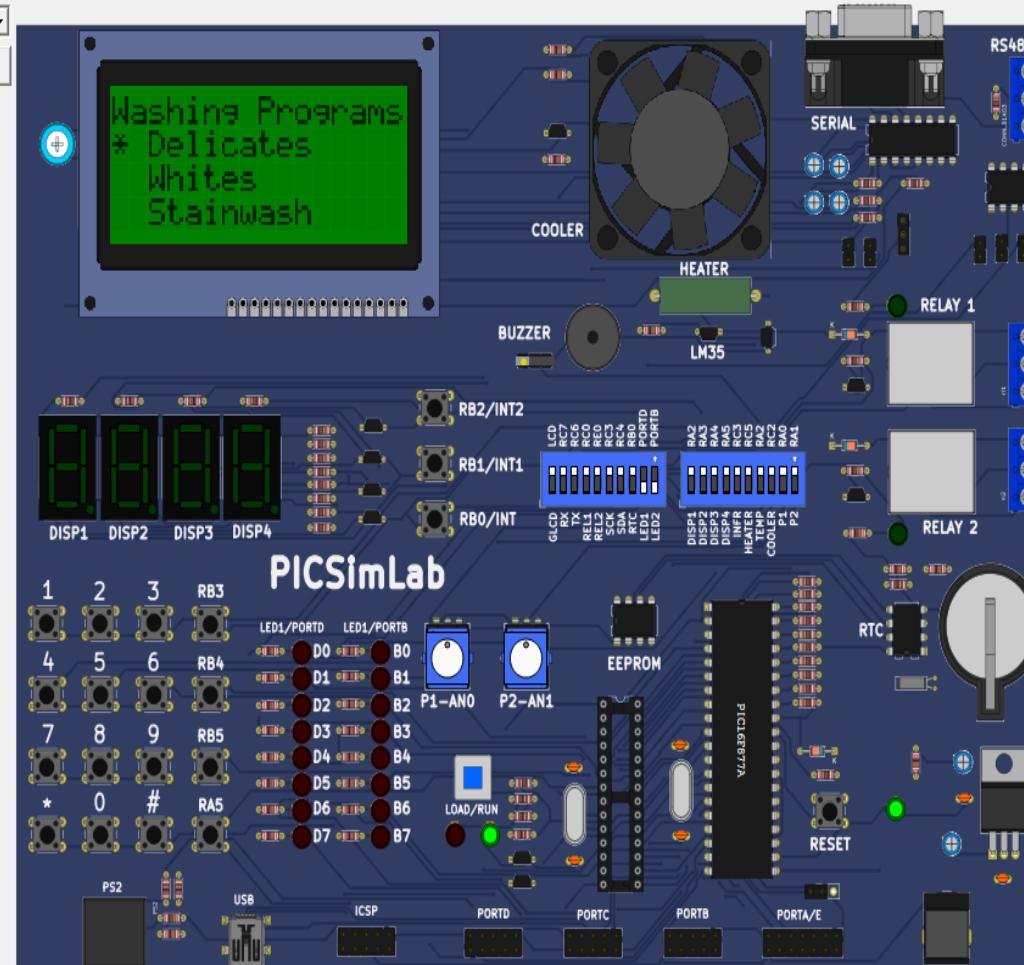
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search

11:39
14-10-2021 ENG 6

Select the Washing Program

Clk(MHz) 20

Spd: 1.00x

Debug

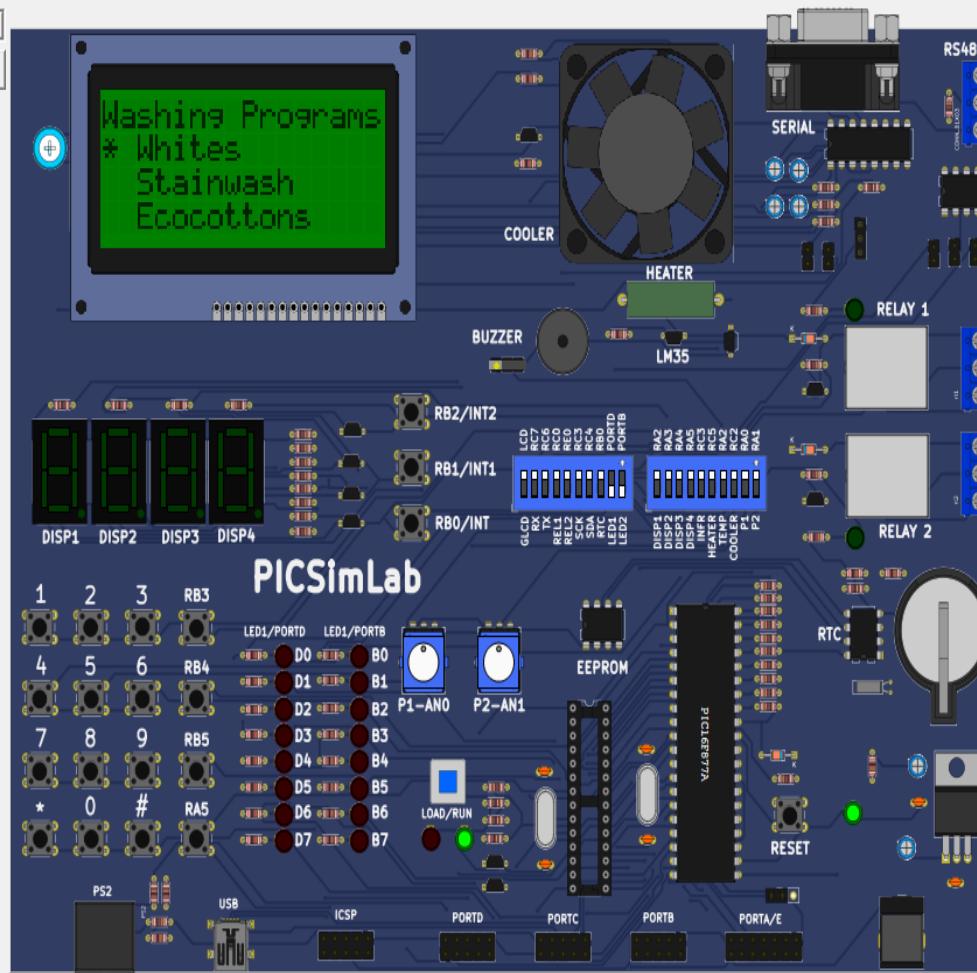
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search

11:39
14-10-2021

Select the types of Clothes

Clk(MHz) 20

Spd: 1.00x

Debug

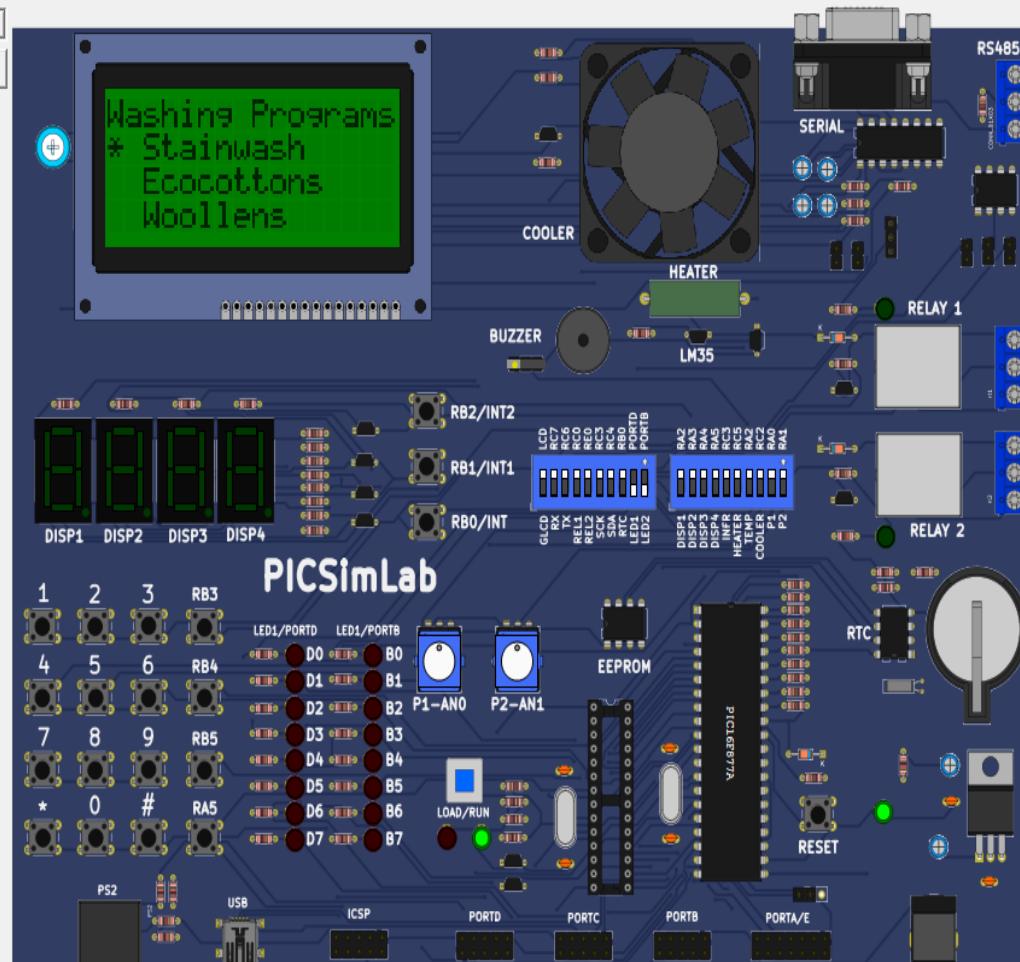
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search



11:39

14-10-2021

Select the types of Clothes

File Board Microcontroller Modules Tools Help

Clk(MHz) 20

Spd: 1.00x Debug

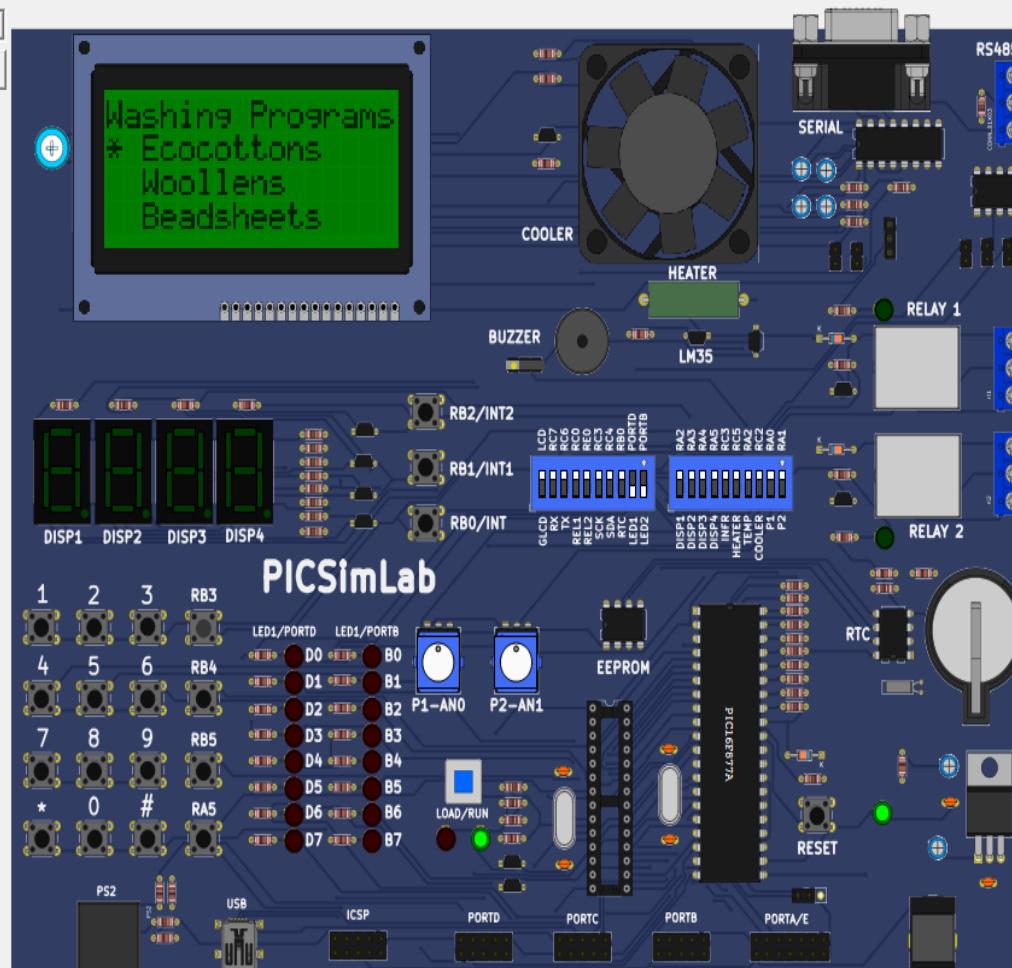
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600 (0.0%)



Type here to search



11:39

14-10-2021



Select the types of Clothes

Clk(MHz) 20

Spd: 1.00x

Debug

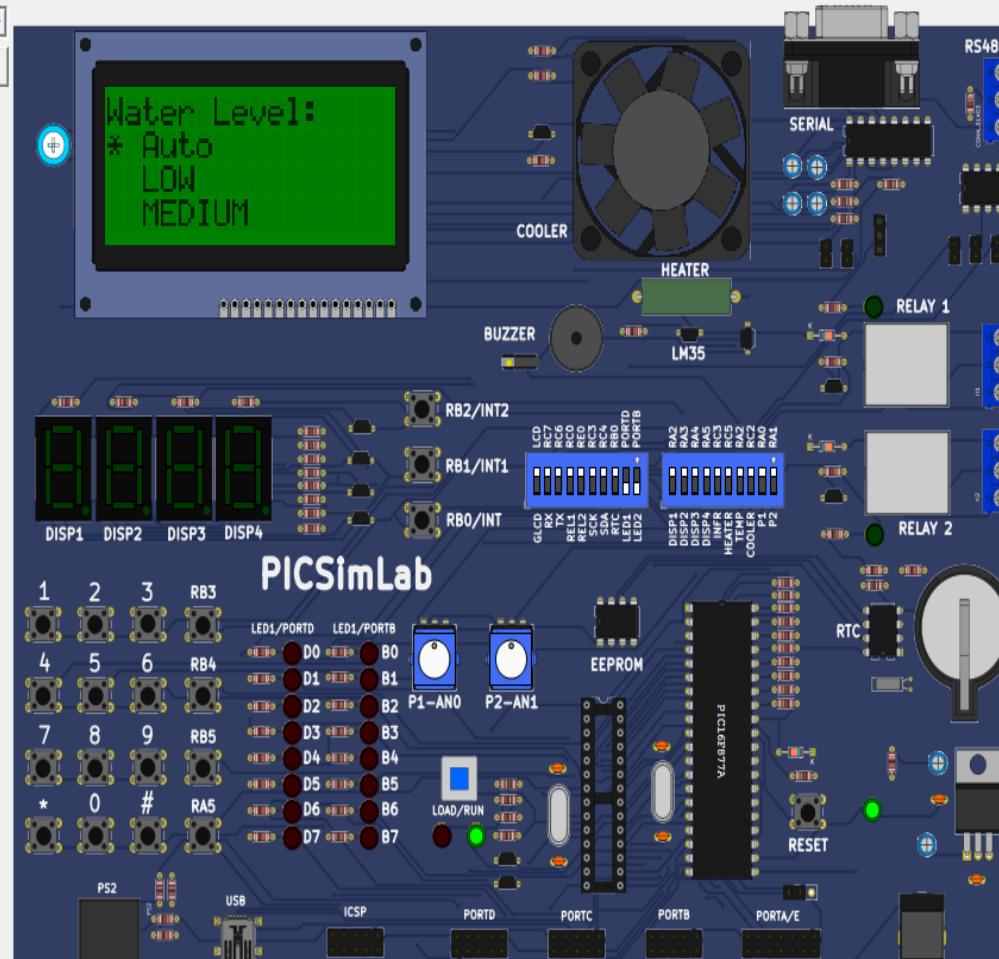
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search



Select the Water Level

File Board Microcontroller Modules Tools Help

Clk(MHz) 20

Spd: 1.00x Debug

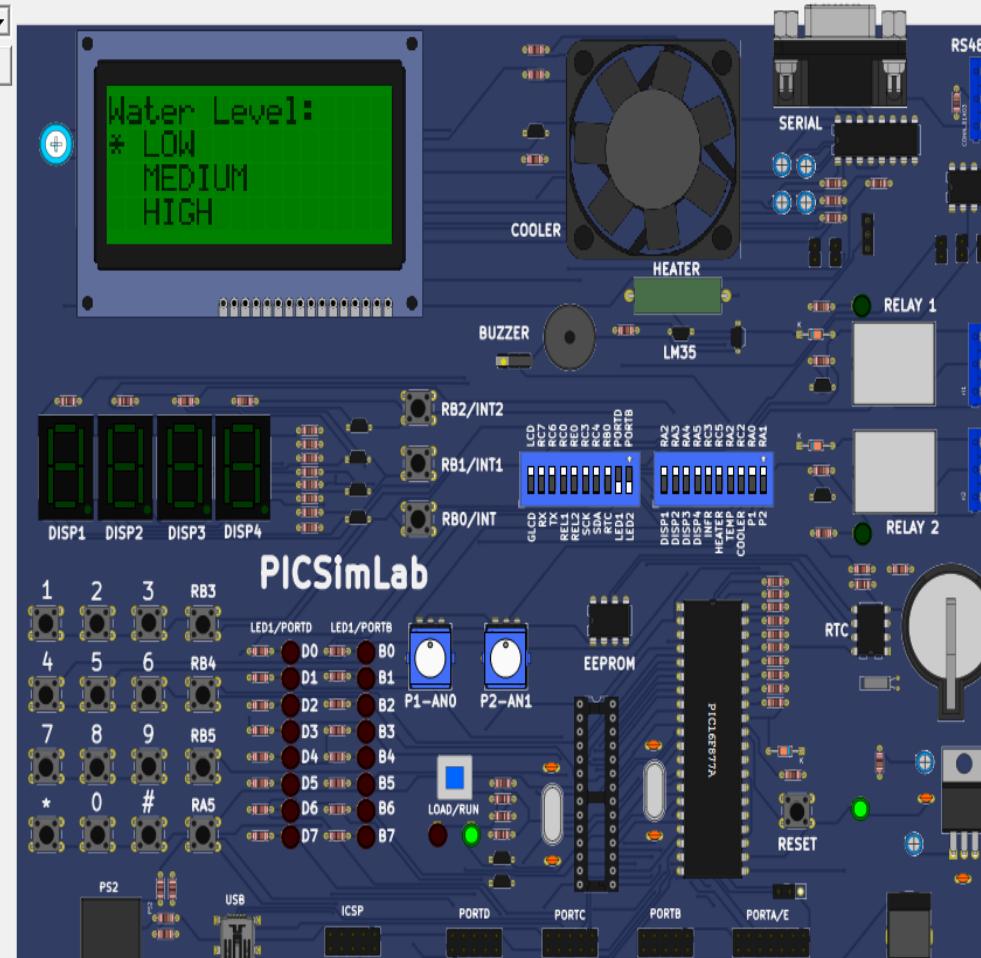
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600(0.0%)



Type here to search

11:40
14-10-2021

Select the Water Level

File Board Microcontroller Modules Tools Help

Clk(MHz) 20

Spd: 1.00x Debug

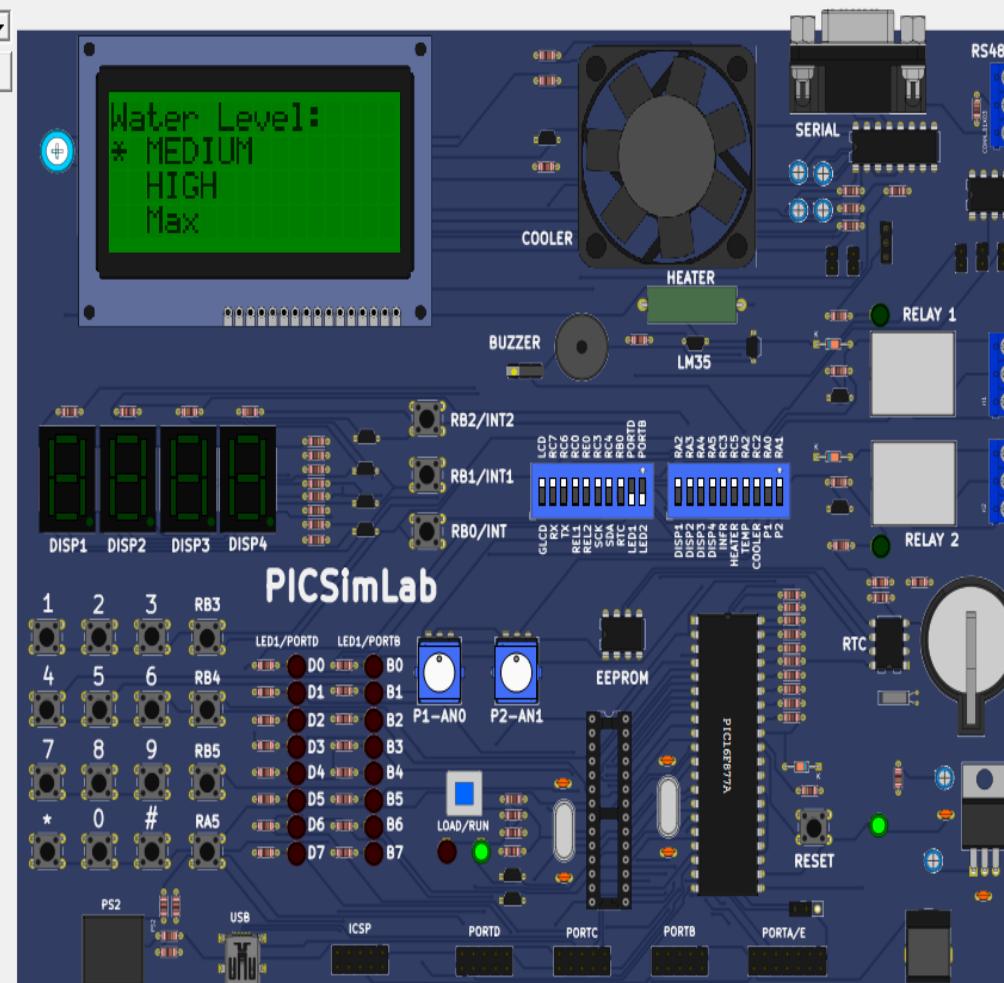
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

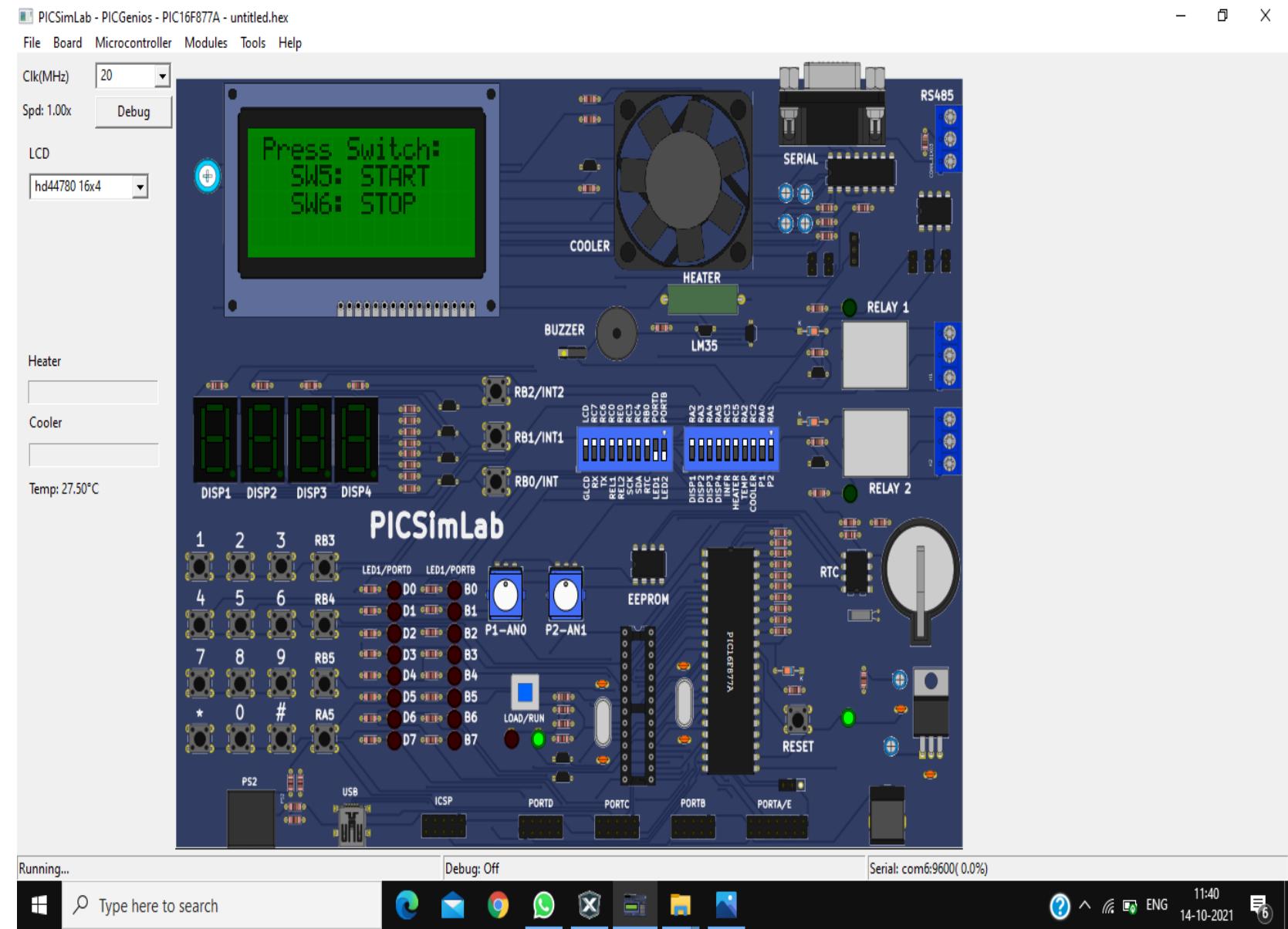
Serial: com6:9600(0.0%)



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11:40
14-10-2021

Select the Water Level



Start and Stop of Wash

Clk(MHz) 20
Spd: 1.00x

Debug

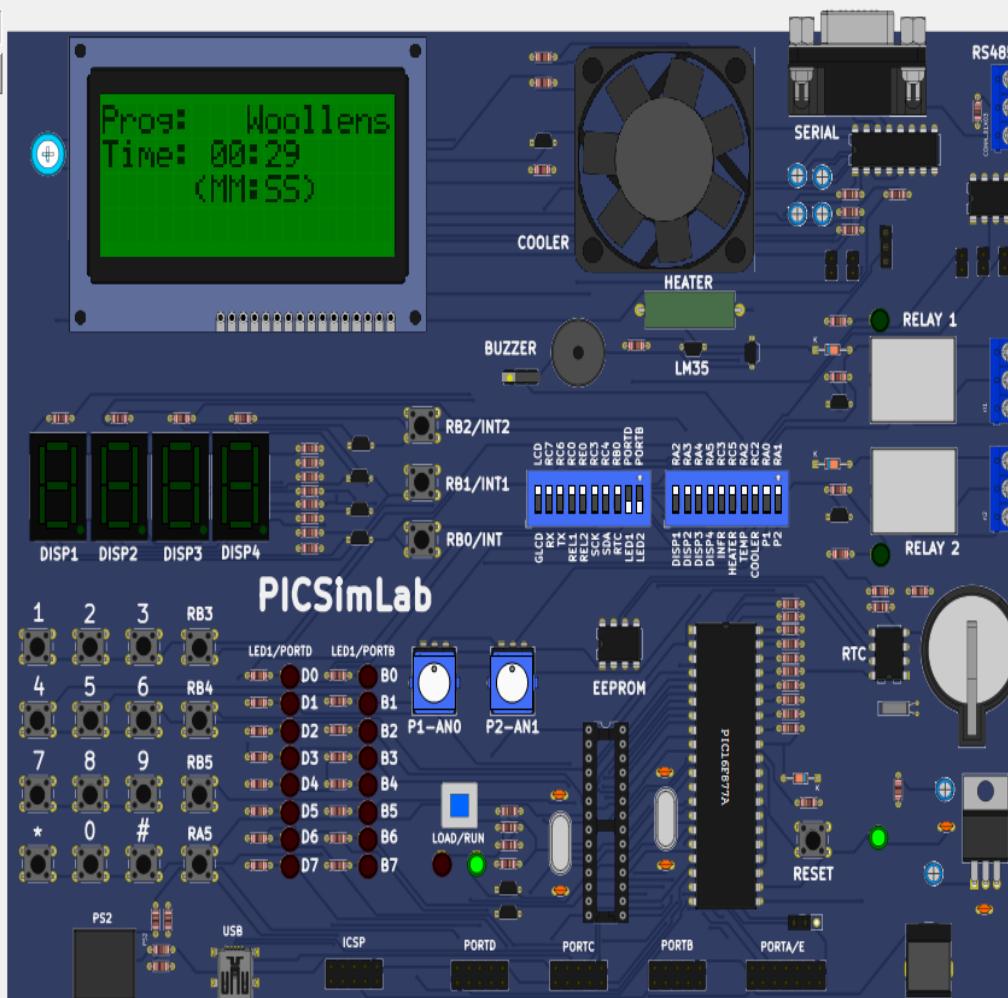
LCD

hd44780 16x4

Heater

Cooler

Temp: 27.50°C



Running...

Debug: Off

Serial: com6:9600 (0.0%)



Type here to search

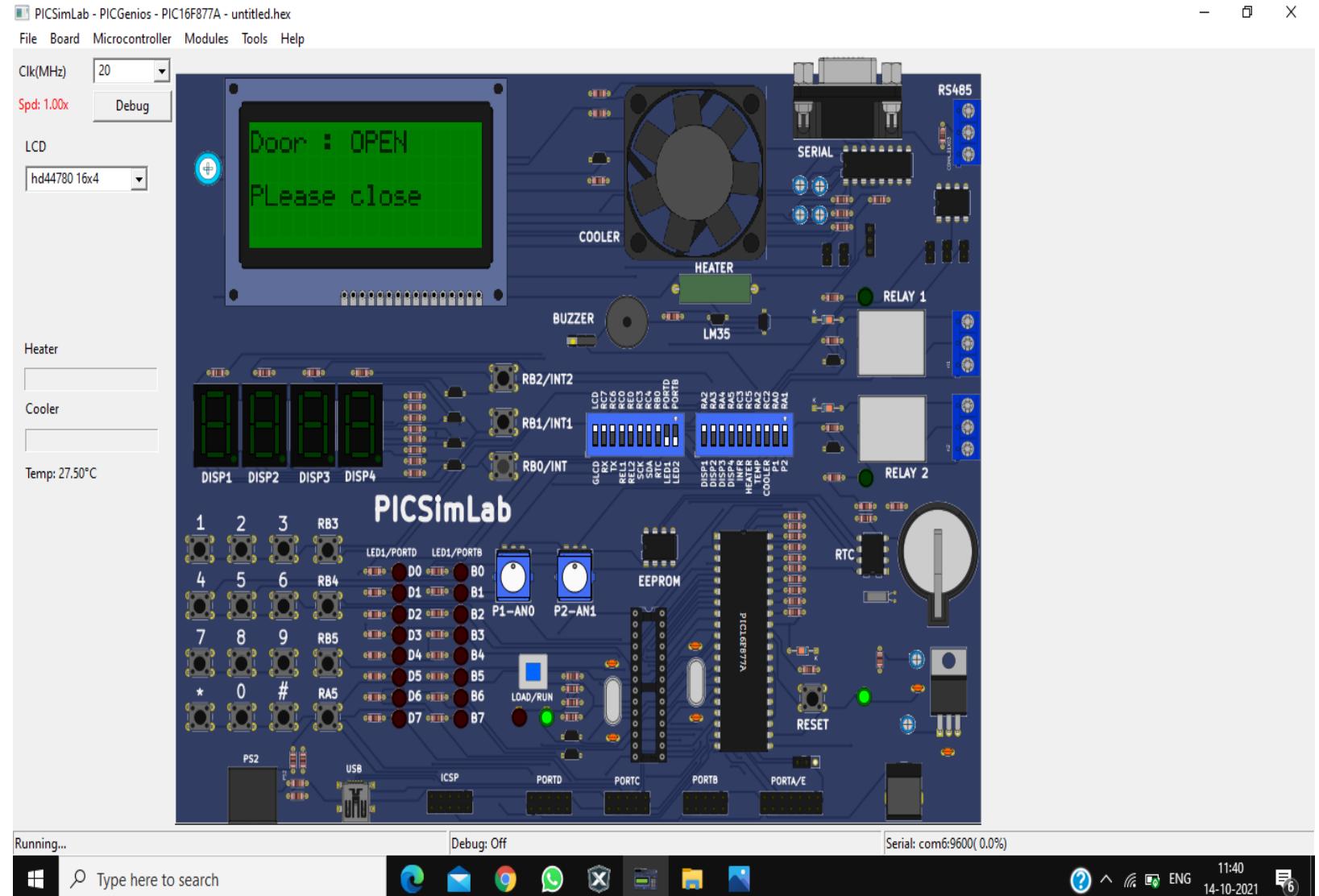


11:40 14-10-2021 ENG 6

Setting up the Washing Time



Starting the Wash



If Door is open, Buzzer will make sound



After completing the wash, display will print the message as remove clothes



Lets See the Actual Working