**DSD Project7**

Legends Team

**Team Name :**

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Project Idea: (**Smart Washing Machine**)

This project should automate the process of the washing machine through the use of FPGA. The machine has four different stages. Each stage take a specific time duration to end its task. Our system allow for adding four items to our washing machine. Each stage is represented by a specific LED with different lighting up colors. The user will be notified by a buzzer at the end of operation.

The components used:

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| --- | --- | --- |
| **Component Name** | **number** | **Its Function** |
| (FPGA)DE10-Lite | 1 | To execute Verilog code and give the outputs |
| ((FPGA) Push-button | 1 | To start our wishing machine |
| ((FPGA) 7-segment | 1 | To display a number of item entered the machine and the time for each stage |
| Breadboard | 1 | To combine our circuit and make its connections |
| dc-motor | 1 | To rotate our wishing machine core |
| Pump | 2 | To pimp water from and into our wishing machine core |
| IR-sensor | 1 | To detect the input item which enter the machine |
| Relay-5V | 1 | To control one of the pumps |
| buzzer | 1 | Alert the user at the end of the operation |
| Bridge | 1 | To connect one motor and one pump |
| Led-diff color | 4 | Indicate the state of the washing |
| 220ohm resistor | 4 | Reduce the voltage assigned to each led |
| Jumpers | - | To connect the circuit |
| Recycled material | - | To build the body |
| Laptop | 1 | To supply the circuit with energy |
|  |  |  |

Inputs handling:

Firstly :- we take input from user to start our machine through clicking the push button.

Secondly:- we take the input from IR-sensor to estimate how many items in the machine and it will start when we reach four.

Output handling:

In sensor stage we give the output to two Altera 7-segments to give the user how many items in the machine.

After taking 4 items we start the second stage in which we operate the first pump to pump the water to the machine core and displaying time on the 7-segments and still for 5 seconds.

After pump water we start third stage by rotating the core to wash the items by giving output to dc motor for 20 seconds and displaying time on the 7-segments and still for 20 seconds.

After that we start third stage by taking water out of the core by giving second pump output for 20 second and displaying time on the 7-segments and still for 20 seconds.

When all of the stages end, we give output to the buzzer to give continous sound for one second and halt our machine.

The problems or limitations:

1- The tubes of the pump were not available in stores so we had to use wide pumbs.

2-The rotation of the cotainer were easily disturbed by the smallest frictions so we had to alter our design alot to provide minimum friction.

3-The power of the pumb was very low which made it less water in and out of the container.

Work division:

* Islam part: The different control signals to the pump and the motor, code implementaion.
* Ahmed Part:The container rotaion mechanics.
* Ibrahim Part: IR-Sensor input.
* Sabry Part:Outputs (buzzer,LEDs,7-segement display).
* Mohanad Part:Design and implementation of Hardware.
* Abd Elrahman Part:Water pump functionality.