

# COCKTAIL DISPENSER MACHINE

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Subject - Digital Electronics II

Ibagué, May -2021

## ABSTRACT

In the following report it is presented in a simple and practical way how to create a prototype of a dispensing machine of 4 different cocktails for family reunions, parties or bars, this machine is capable of providing cocktails in less than a minute in a 7oz or larger base. For this, a PIC16F15244 is implemented, which was programmed in C language through the MPLAB X IDE software, in addition commercial and accessible components are implemented, with respect to its operation, an LCD screen will be used where the different combinations are visualized and by means of buttons pick your favorite drink. In the following **GitHub repository**, you can find the algorithm in C and more information about the project. <https://github.com/sebastianjim99/COCKTAILS-DISPENSER-MACHINE-.git>

## INTRODUCTION

The microcontroller is a programmable integrated circuit that contains a CPU and different resources. It is used to control the operation of a specific task, its input/output lines support the connection of the sensors and actuators of the device to be controlled. [1] In addition, they have been used in commercial electronic circuits for several years in a massive way, as they allow reducing the size and price of the equipment. [2]

The areas of application of microcontrollers can be considered unlimited, they will demand a gigantic design and manufacturing work. But, learning to handle and apply microcontrollers can only be achieved by developing real designs in a practical way.

In this way, preparing a cocktail at family meetings, parties or bars is annoying and time

consuming; In addition, currently due to the pandemic generated by Covid-19, less physical contact and crowds of people are sought. It is also unproductive when an employee is in charge of preparing several cocktails. Besides, it is dangerous when having contact with other people. Therefore, an electronic system is proposed to dispense several drinks in a given time and communicate with the customer through a screen and selection buttons, this will be controlled by an MCU (PIC16F15244 Curiosity Nano).

## OBJECTIVES

### General

Design an automatic mechanism capable of dispensing drinks supported by an LCD display and buttons.

### Specific

- Estimate the amount of liquid for each preparation and the operating time of each pump.
- Develop and implement an algorithm that allows controlling the different processes to dispense and mix certain liquids.
- Establish a structure for the selection and distribution of certain beverages.

## METHODOLOGY

It begins with a study on the capabilities of the MCU-PIC16F15244 Curiosity Nano, in which the Debugger and the PIC16F15244 are separated into two parts. The PIC has a 7k (bytes) program flash memory, 18 connection pins, 1MHz frequency, PWM (Pulse Width Modulation) and ADC (analog-digital) channels.

From the above, we proceeded to design a machine capable of dispensing 4 drinks with the support of

an LCD screen and buttons; For this, the following drink combinations were established:

- Cocktail-1: Vodka and Ginger.
- Cocktail-2: Vodka and Orange
- Cocktail-3: Ron and Ginger.
- Cocktail-4: Ron and Orange juice.

Where the drinks in each motor are the following:

- **Motor 1**→ Vodka
- **Motor 2**→ Ginger
- **Motor 3**→ Ron
- **Motor 4**→ Orange juice

Subsequently, a flowchart was developed that allowed to have a general idea of the mechanism and algorithm to be developed. The flowchart is in the [Git-Hub repository](#). In this way, the necessary materials were established with their quotation as shown in table 1.

**Table 1.** Materials

MATERIAL'S LIST			
Quantity	Description	Unit price	Total price
4	Pumps (motors)	\$ 16.000	\$ 64.000
3	Led Strips	\$ 5.000	\$ 15.000
4	Buttons	\$ 500	\$ 2.000
1	Display LCD 20x4	\$ 14.000	\$ 14.000
10	Transistors NPN (2N2222)	\$ 200	\$ 2.000
1	Relay Module (5V)	\$ 12.000	\$ 12.000
30	Jumpers	\$ 200	\$ 6.000
1	Source and adapter	\$ 3.000	\$ 3.000
6	Resistors 330Ω y 10kΩ	\$ 300	\$ 1.800
1	Potentiometer 10kΩ	\$ 500	\$ 500
2	Voltage regulator module LM2596	\$ 1.000	\$ 2.000
1	PIC16F15244 Curiosity Nano	\$ 72.000	\$ 72.000
3	Hoses	\$ 500	\$ 1.500
1	Wood	\$ 20.000	\$ 20.000
1	Funnel	\$ 2.000	\$ 2.000
	<b>TOTAL</b>		<b>\$ 217.800</b>

Next, the input and output pins were distributed according to the components as shown in table 2. The inputs will be the buttons; these have a pull-up connection as shown in [figure 1](#) with a 10kΩ protection resistor. The outputs are the motors, the LED strips and the LCD screen.

**Table 2.** Pin distribution

CONNECTION PINS ON THE PIC16F15244			
Display LCD	Relay-Motors	Led Strips	Buttons
RB4	Motor1-RA4	RA2	Button1-RC0
RB6	Motor2-RA5	RB7	Button2-RC1
RC5	Motor3-RA1	-	Button3-RC2
RC4	Motor4-RB5	-	Button4-RC3
RC6	-	-	-
RC7	-	-	-

With this clear, we proceed to create an algorithm in C language using the MPLAB X IDE environment; This will be structured in 4 important functions: Activation of motors, sequences of the LED strips (delay time), writing on the LCD and test of buttons.

#### • Activation of motors

This function will vary according to the selected cocktail, what is done is to activate a motor of a certain drink, give a waiting time and then activate the motor of the complementary drink. The combinations are given in table 3.

**Table 3.** Activation and waiting time of the motors

	M1-Vodka	M2-Ginger	M3-Ron	M4-Naranja	Wait time
Cocktail 1	ON	ON	OFF	OFF	M1=12s y M2=20s
Cocktail 2	ON	OFF	OFF	ON	M1=7s y M4=15s
Cocktail 3	OFF	ON	ON	OFF	M2=15s y M3=20s
Cocktail 4	OFF	OFF	ON	ON	M3=20s y M4=15s

#### • Sequences of the led strips (waiting time)

Different sequences of turning on and off the LED strips were developed, depending on the required waiting time of 7s, 12s, 15s or 20s. This is set out in Table 3.

#### • Writing on the LCD screen

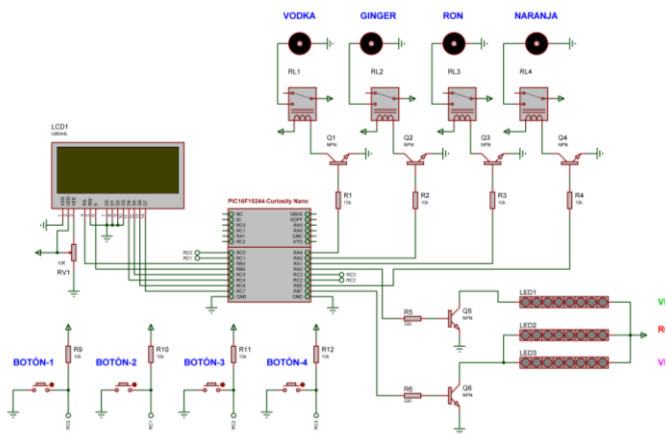
One library is adapted for operation of the LCD 20x4 in 4-bit control mode. This is the means of interaction with the client, a greeting, a menu of 4 cocktails, a "preparation" instruction and a farewell will be shown.

#### • Button test

It is the function that will detect if a button is pressed, it does so through the PORTXbits function. In this way, the drinks are selected, the button distributions are shown in table 2.

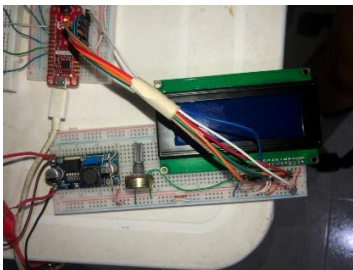
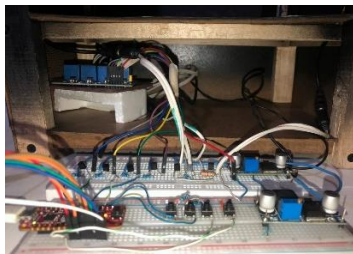
## RESULTS

The result is a code in C language, it is in [the repository](#). The following circuit of figure 1 is obtained.



**Figure 1.** Final circuit

In addition, the structure and operation are shown.



**Figure 2.** Practical circuit assembly



**Figure 3.** LCD operation



**figure 4.** Structure of the cocktail dispenser machine

## CONCLUSIONS

Through the development of this project, it was possible to solve the problem posed, by means of a machine capable of dispensing drinks supported by an LCD screen and buttons, implementing a PIC16F15244 MCU that controls all the processes carried out by the machine and its components.

Due to the limited pins and the series operation of the MCU, different interruptions were implemented in the time that were achieved with the use of the sequences of the led strips and delays between them.

## BIBLIOGRAPHY

- [1] J. Angulo Usategui y I. Angulo Martinez, Microcontroladores -PIC- Diseño práctico de aplicaciones, España: McGRAW-HILL/INTERAMERICANA DE ESPAÑA, S. A. U, 2003.
- [2] E. Palacios, F. Remiro y L. López, Microcontrolador PIC16F84-Desarrollo de proyectos, Mexico: Ra-Ma, 2002.