Mapúa University

School of Electrical, Electronics and Computer Engineering

Introduction to Embedded Systems

COE185P/ E01

Pushbutton Switch

Experiment No.3

Submitted By:

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Submitted To:

Engr. Jocelyn Villaverde

I. Introduction

This experiment is about pushbutton switches and different concepts that involve pushbutton. The pushbutton switch is a classic type of momentary switch, it only remains on its state if it is being pressed; commonly used as keypads buttons. The main objective of this experiment is to study how to use the push button in myRIO and incorporate into a simple system.

II. Objectives

1. Discuss the essential concepts associated with a pushbutton switch:
   a. Pushbutton witch appears as a short circuit when pressed, otherwise as an open circuit.
   b. Interface circuit to the digital input relies on the DIO internal pull resistors to eliminate the need for additional components (pull-up on MXP Connectors A and B, pull-down on MSP Connector C).
   c. Block diagram views the switch as a Boolean (two-level) signal that is either active-high or active-low depending on the type of pull resistor.
   d. Apply software-based edge detection on convert a pushbutton press into a trigger event.

III. Materials and Components

- Pushbutton Switch (integrated with rotary encoder).
- Breadboard.
- Jumper wires, M-F (2)
- NI myRIO

IV. PROCEDURE

Step 1. Connect the connecting wires as the instruction are given in the pdf file.

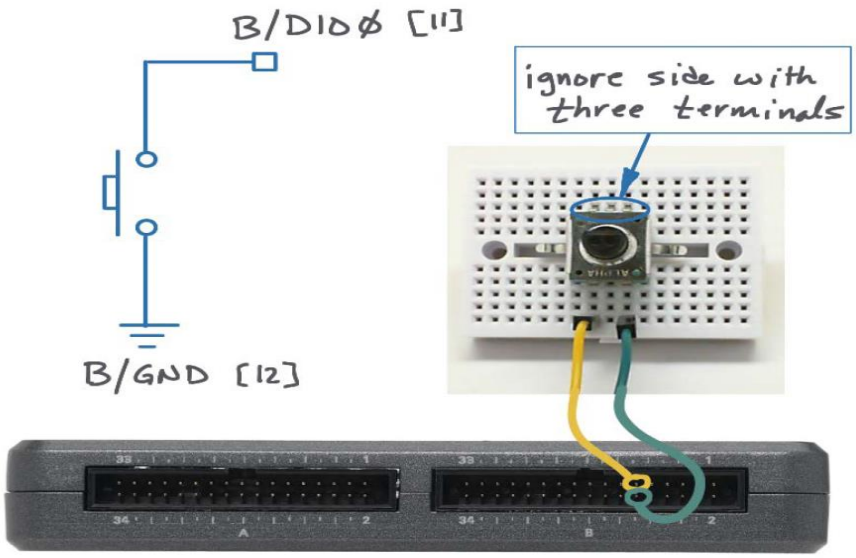

Figure 1. Demonstration circuit for pushbutton switch: schematic diagram, recommed breadboard layout, and connection to NI myRIO

Step 2. Download the pushbutton DEMO file

link: http://www.ni.com/academic/myrio/project-guide-vis.zip

Step 3. Open labVIEW and run the pushbutton DEMO

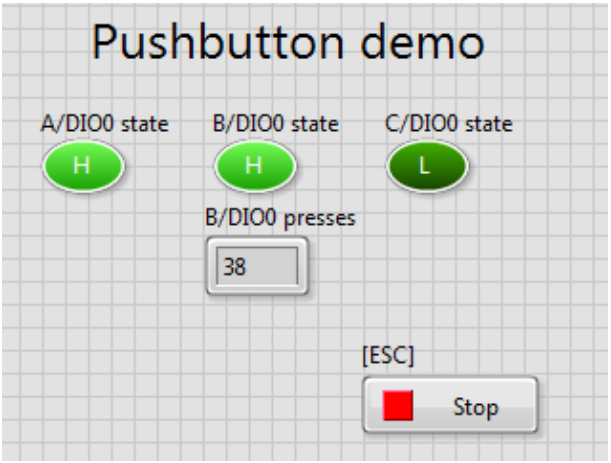

Figure 2. Pushbutton DEMO Front-panel

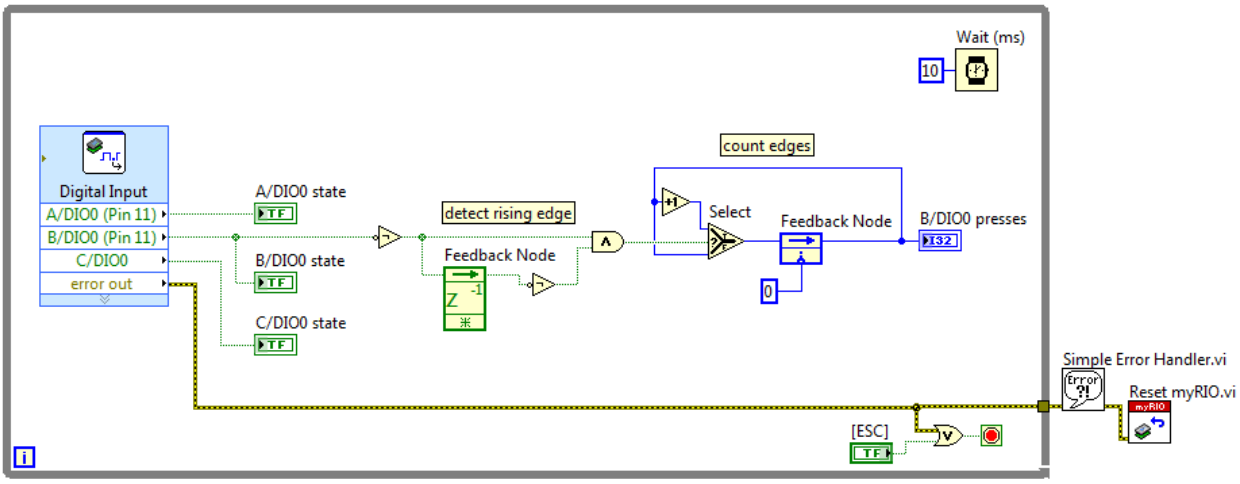

Figure 3. Pushbutton DEMO Schematic

Basic Modifications

Experiment with different values of loop speed by adjusting the value of Wait (ms); you may find it more convenient to change the constant to a front-panel control. At what value does the VI introduce noticeable delay responding to the pushbutton press?

Step 1. Add a Numeric

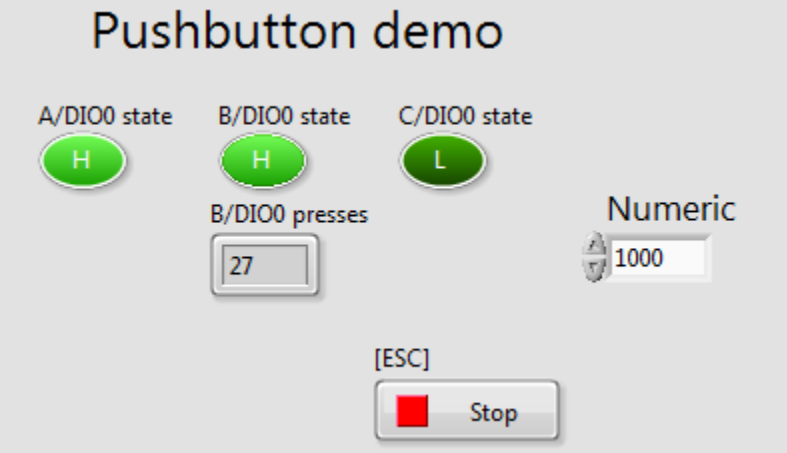

Figure 4. Pushbutton DEMO mod

Step 2. Connect the numeric to the Wait(ms).

Figure 5. Connecting numeric

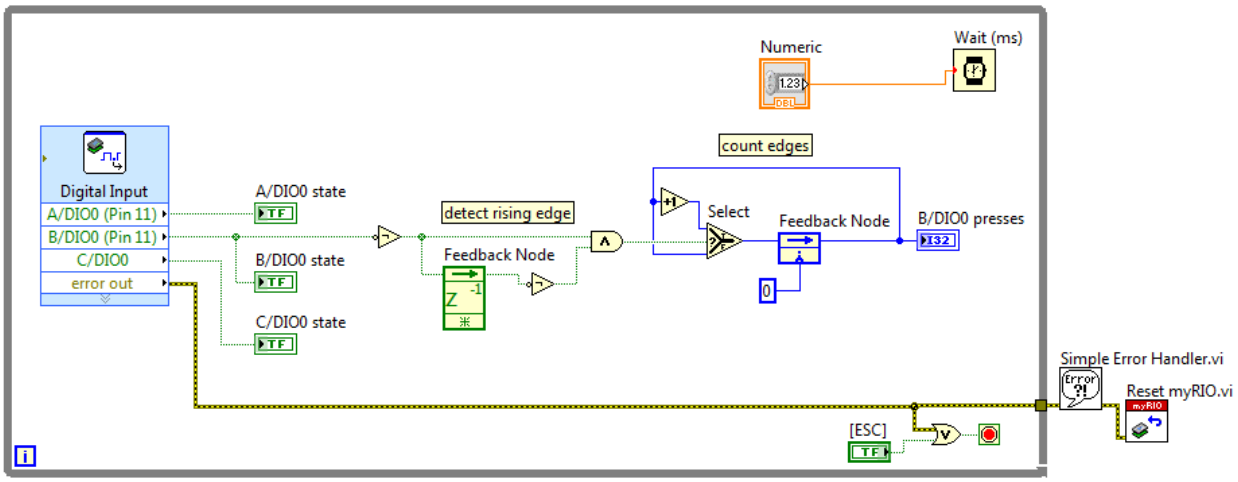

Figure 6. Final Schematic MOD

V. Results and Discussion

The first part of the experiment was just pressing the pushbutton and the counter counts how may times you pressed the button and the B/DIO state turns HIGH or ON if the push button is pressed.

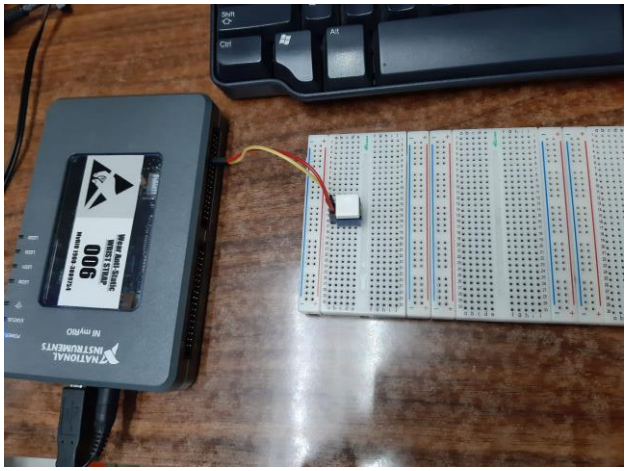

Figure 6. Actual setup of the experiment

In the second part of the experiment I added a numeric front panel to adjust the Wait(ms), as the value increases the longer you must press the pushbutton for it to register or the counter counts the pressed button.

VI. Conclusion

The purpose of this experiment was to gain knowledge on how to use pushbutton when it is connected to NI myRIO and the different concepts on how to use pushbutton. As the pushbutton is being pressed the counter counts with the help of Boolean. In the modifications of the experiment I can conclude that when the value of Wait (ms) goes up the longer you have to press the pushbutton in order for it to register based on the results and discussion.

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DIP Switches

Experiment No.4

Submitted By:

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I. Introduction

DIP switches bundle multiple SPST switches together into a single component according to the book manual, DIP stands for “dual-in-line package”, the standard IC package style that is breadboard compatible.Two popular DIP switch style: a standard DIP switch containing eight SPST switches and a 16 position rotary DIP switch that manipulates the open-and-closed states of four SPST switches in a binary sequency.

II. Objectives

1. Describ the following concepts related to switches and the NI myRIO interface:
   a. DIP switch bundles bundles N PST switches into a single component with each switch appearing as a short circuit in one position and as an open circuit in the other.
   b. 2N position rotary switch bundles N SPST switches into a single component, rotating the dial create a binary sequence of open-close switch states.
2. Interface a switch on any of the NI myRIO connectors without using additional components by using the DIO internal pull resistors.
3. Interpret the combined switch open-closed patterns as an interger numerical value, binary array, and individual bit fields.

III. Materials and Components

- DIP Switch
- Rotary DIP switch
- Breadboard
- Jumper Wires, M-F (14x)
- Small srewdriver

IV. PROCEDURE

Step 1. Download the DIP switch DEMO

Link: http://www.ni.com/academic/myrio/project-guide-vis.zip

Step 2. Open the DIP Switches DEMO

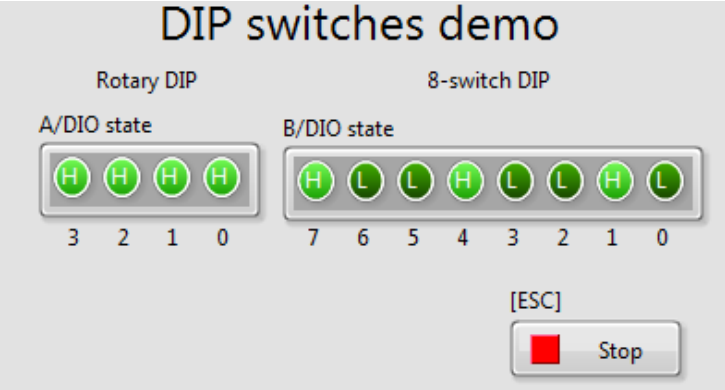

Figure 1. DIP switches demo

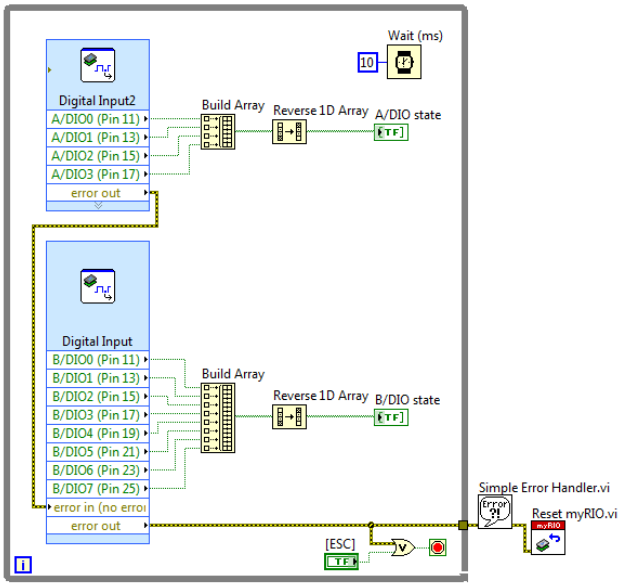

Figure 2. DIP Switches Schematic

Step 3. Connect the Wires

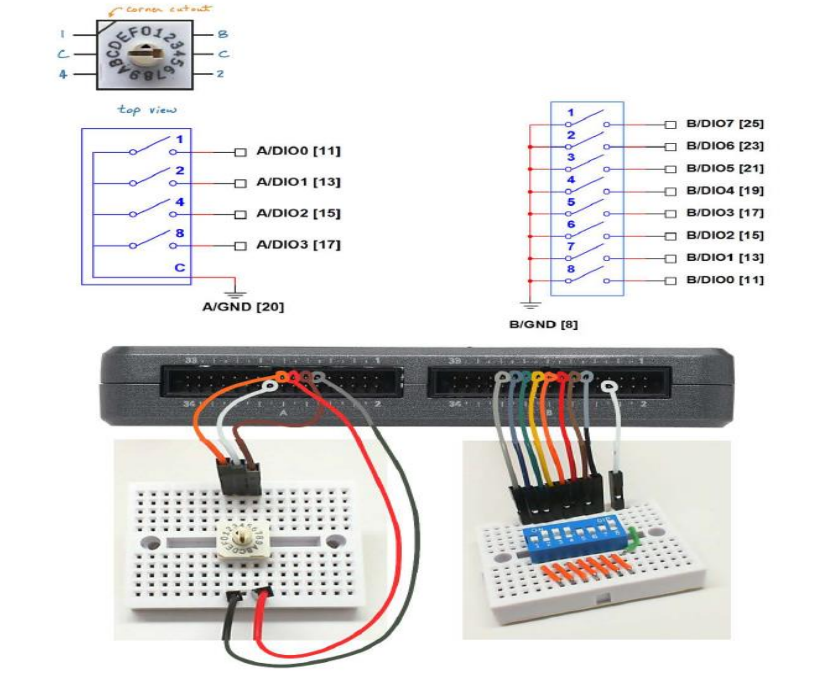

Figure 5.2: Demonstration circuit for DIP switches: schematic diagram, recommended breadboard layout, and connection to NI myRIO MXP Connectors A and B.

Figure 3. Experiment Guide

Step 4. Run the DEMO

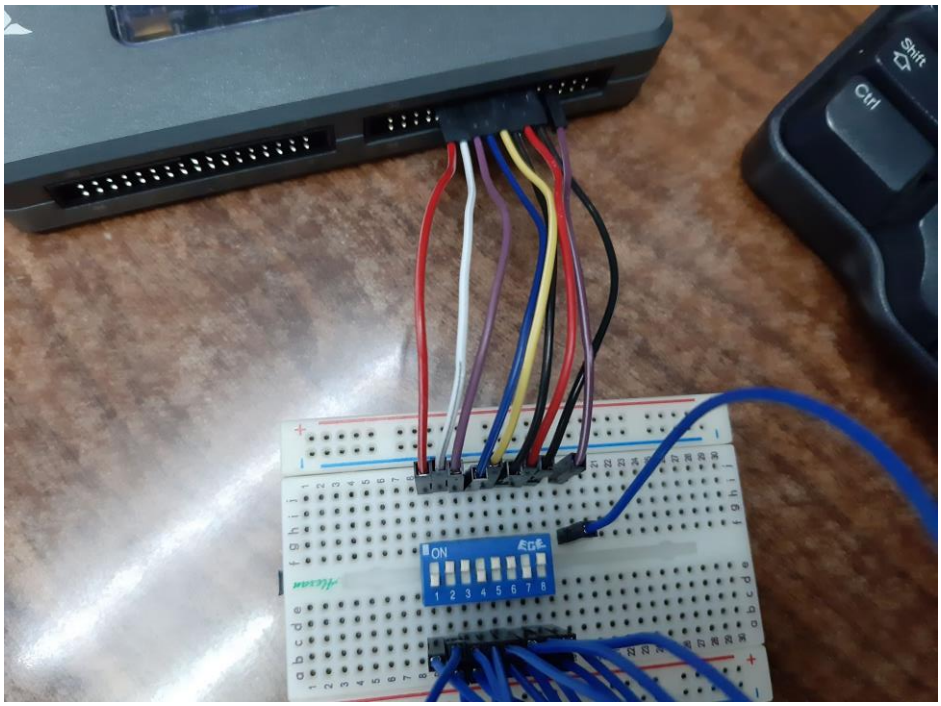

Figure 4. Actual Setup of the Experiment

V. Results and Discussion

When the connections are complete we tested the experiment when the switch is ON the front panel indicate that it is HIGH when the switch is OFF the front panel indicate that is is LOW. We Did some modifications because when we are turning on the DIP switch it show LOW signal from the front panel, so we modify the schematic adding an INVERTER see figure 5.

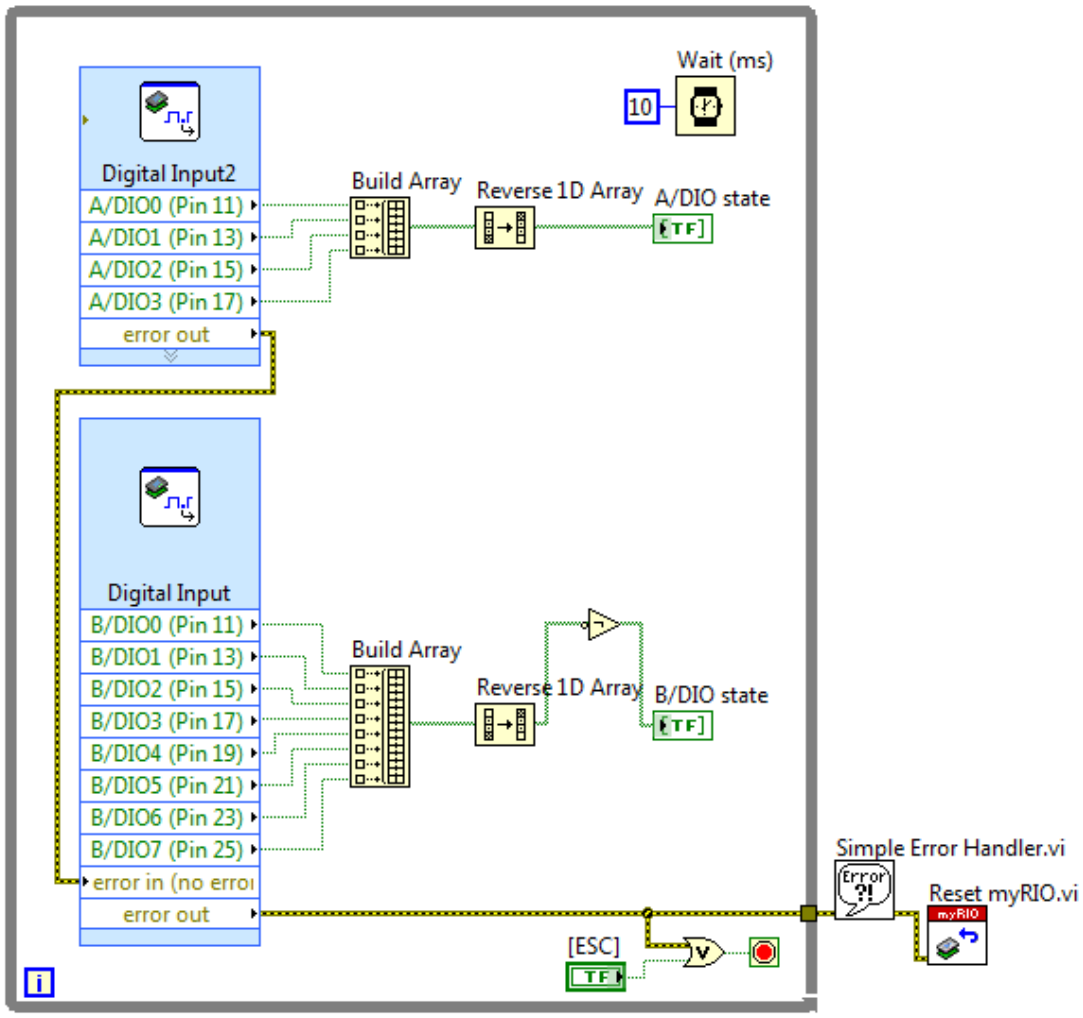

Figure 5. inverter MOD

VI. Conclusion

In this experiment we used DIP switches, during the experiment there were some errors but we resolved it by putting an inverter in the schematic. As the DIP switch is turned on the LED in the front panel lights up indicating that it is ON, we can manipulate DIP switches in many ways like using it to make a binary and etc. The experiment activities were working therefore I conclude that this experiment was a successful one.