



# Mapúa University

School of Electrical, Electronics and Computer Engineering

## Introduction to Embedded Systems COE185P/ E01

### Pushbutton Switch

Experiment No.3

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#### **Submitted To:**

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# **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**

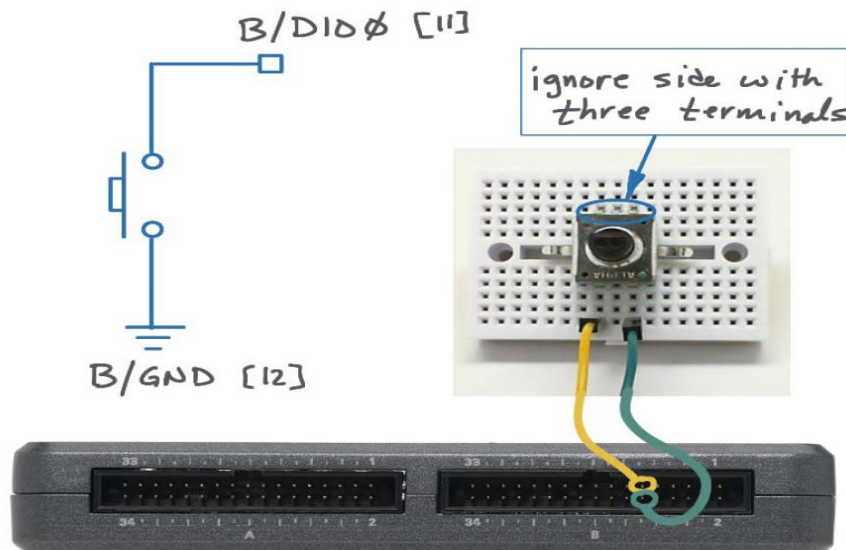
1. Discuss the essential concepts associated with a pushbutton switch:
  - a. Pushbutton switch appears as a short circuit when pressed, otherwise as an open circuit.
  - b. Interface circuit to the digital input relies on the DIO internal pull resistors to eliminate the need for additional components (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

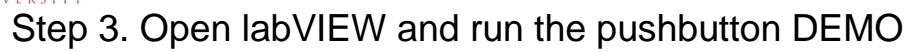
Step 1. Connect the connecting wires as the instruction are given in the pdf file.



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

Step 2. Download the pushbutton DEMO file

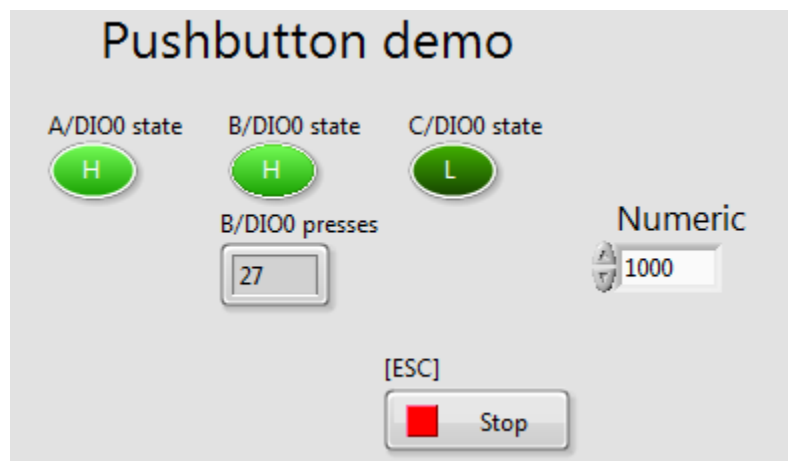
link: <http://www.ni.com/academic/myrio/project-guide-vis.zip>



## 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

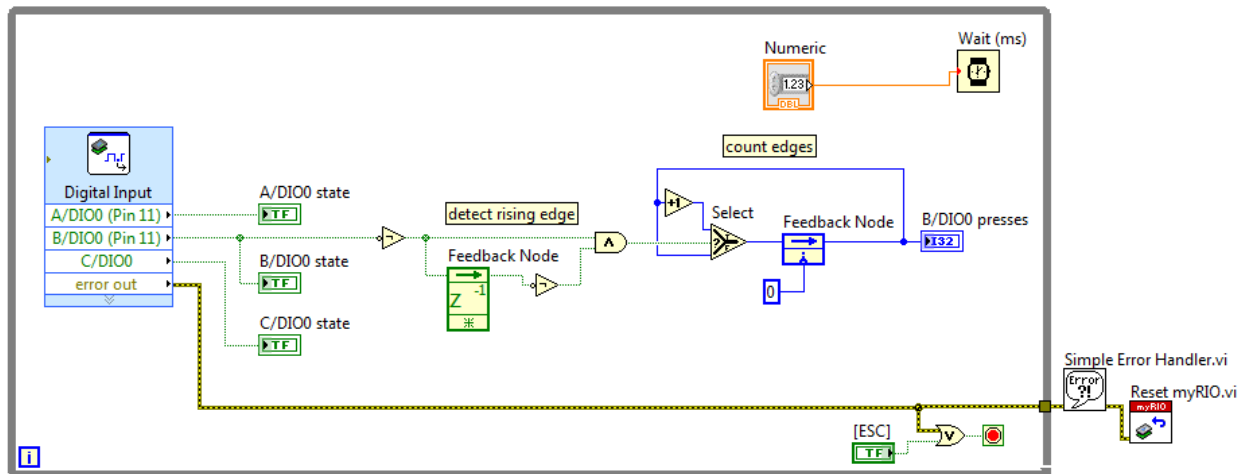


*Figure 4. Pushbutton DEMO mod*

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



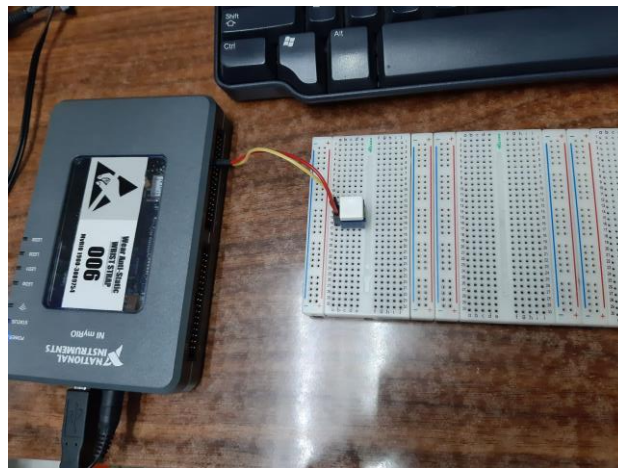
*Figure 5. Connecting numeric*



**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 many 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.