I Wish I Knew How To …

Program Raspberry Pi 4B

Electronics with Xojo

June 2020 Edition (3.0)

32-Bit Raspberry Pi OS

Buster Edition

By Eugene Dakin

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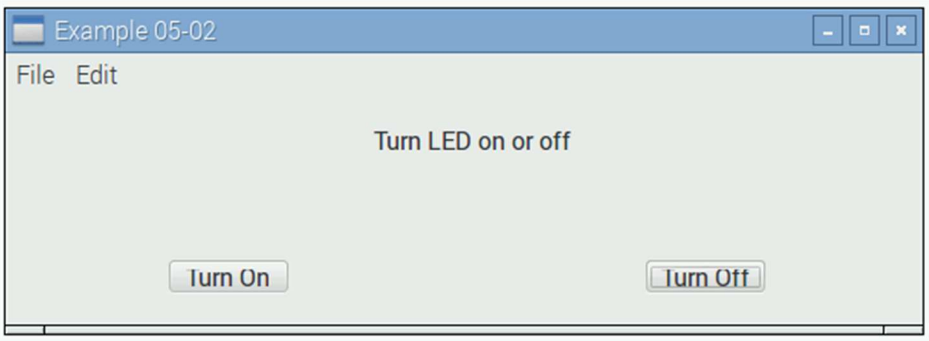
LED On and Off

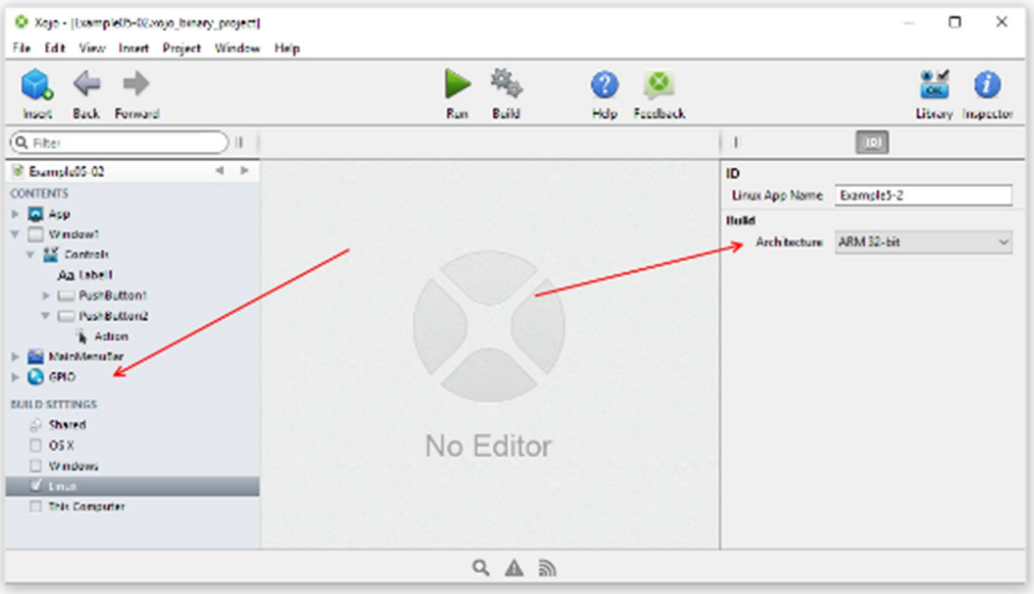
This example shows how to turn the LED light on and off by using the Xojo program. Make sure that the GPIO module (pigpio.xojo_binary_code at https://github.com/eugenedakin/pigpio-GPIO) have been installed/added before building this program (see section on Setup Pi and Xojo). Drag and drop the downloaded pigpio.xojo_binary_code to your Xojo application that will run on the Raspberry Pi.

This example will be a desktop program which will have two buttons, one to turn on the LED and the other to turn the LED off. Start Xojo and create an empty desktop program. Add one label and two pushbuttons and the layout should be similar to the below screen grab.



The button on the left side will Turn-On the LED light and the pushbutton on the right side will Turn-Off the LED light.

Figure 35. GPIO and ARM 32-bit Architecture



The next step is to add the GPIO module by dragging-and-dropping it into Example 5-2 of the XOJO IDE editor.

Create a new global property in Window1:

Code 6. Example 5-2: Window1 Global Property

```
Public Property pi as pigpio
```

Create a Window1 Open event and add the following code that only starts once.

Code 7. Example 5-2: Window1 Open Event

```
Sub Open() Handles Open
  //First step, drag and drop pigio class on to the
  //Window1.

  //This line with the  correct name of the class
  //on the window must be added in the Window1 Open Event
  //**Only call this once in the program**
  pi = New pigpio
  Call pi.gpioInitialise()
  pi.Handle = pi.pigpio_start(nil, nil)

  //Thats it!
End Sub
```

The pigpio_start command can only be called ***once*** when the program is running, and it is preferably placed in the Window1 Open event.

Add an action event for the pushbutton with the text 'Turn On' and add the following code:

Code 8. Example 5-2: Turn On

```
Sub Action() Handles Action
  //Set pin #18 to be output
  Call pi.set_mode(18, pi.OUTPUT)

  //Turn pin #18 on
  Call pi.gpio_write(18, pi.ON)
End Sub
```

This code sets up the GPIO with a declare in the set_mode method. In our example the power (+ side) for the LED will be at pin number 18. The electrical pin on the Raspberry Pi to have changes is the pin number (#18) and the pin is set to change the output. The pin can either accept an instruction (example: input from a switch) or set a voltage (turn output power on or off), and in this case the PinMode sets the pin to change its output.

Code 9. pinMode Method

```
Public Function set_mode(gpio as UInteger, mode as UInteger) as Integer
```

Pins can be set to either INPUT, or OUTPUT. Only pin #1 supports PWM output. Other pins can be modified by code to resemble PWM output.

The last line of code is to change the digital value to turn the pin on (pigpio1.ON = 1) or turn power off to the pin (pigpio.OFF = 0).

Code 10. digitalWrite Method

```
Public Function gpio_write(gpio as UInteger, level as UInteger) as Integer
```

This sets the value of the pin to either on (1) or off (0).

Code is similar to turn off the LED light, and the following code is added to the pushbutton with the text 'Turn Off':

Code 11. Example 5-2: Turn Off

```
Sub Action() Handles Action
  //Set pin #18 to be output
  Call pi.set_mode(18, pi.OUTPUT)

  //Turn pin #18 off
  Call pi.gpio_write(18, pi.OFF)
End Sub
```

The GPIO is setup, the pin number constant is created, the pin is set to change its output (power on or off), and pin #18 is turned off (pi.OFF).

Copy Example 5-2 executible folder with subfolders that have been generated by Xojo and place them on the Raspberry Pi desktop.

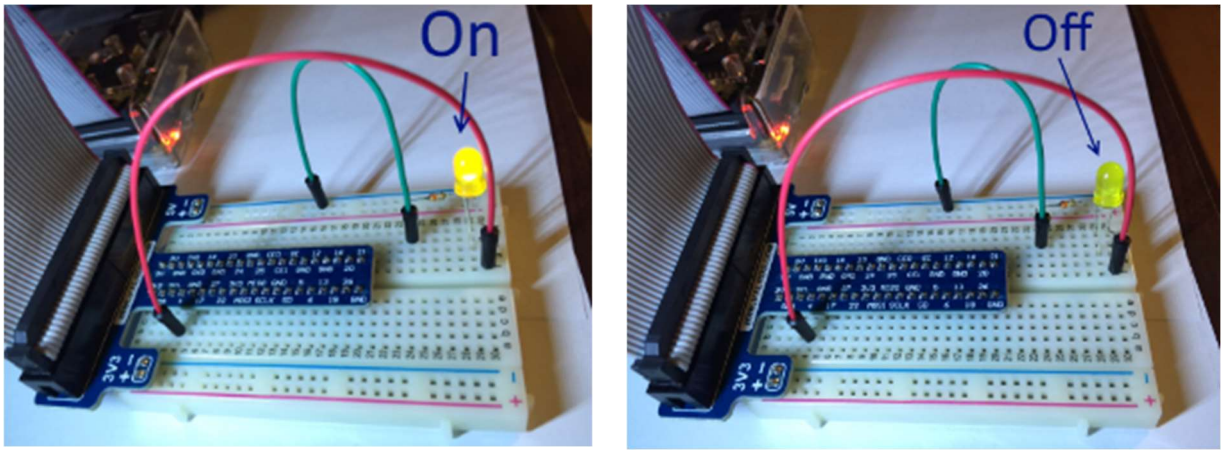
Open the copied files with a Terminal, and type the following code to give the program permission to run.

Code 12. Raspberry Pi Terminal Code to Run the App

```
sudo chmod +x Example5-2    //This gives the program permission to run
sudo ./Example5-2           //This runs the program on a Raspberry Pi
```

Next, lets wire LED to the Raspberry Pi GPIO electrical pins.

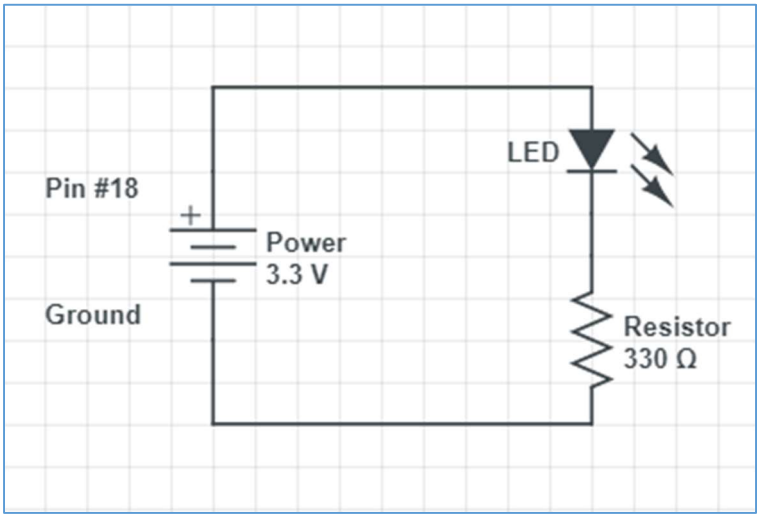
Figure 36. Pi LED On and Off



When the Xojo program 'Turn On' pushbutton is pressed then the LED light turns on. When the pushbutton with the text 'Turn Off' is pressed then the LED turns off.

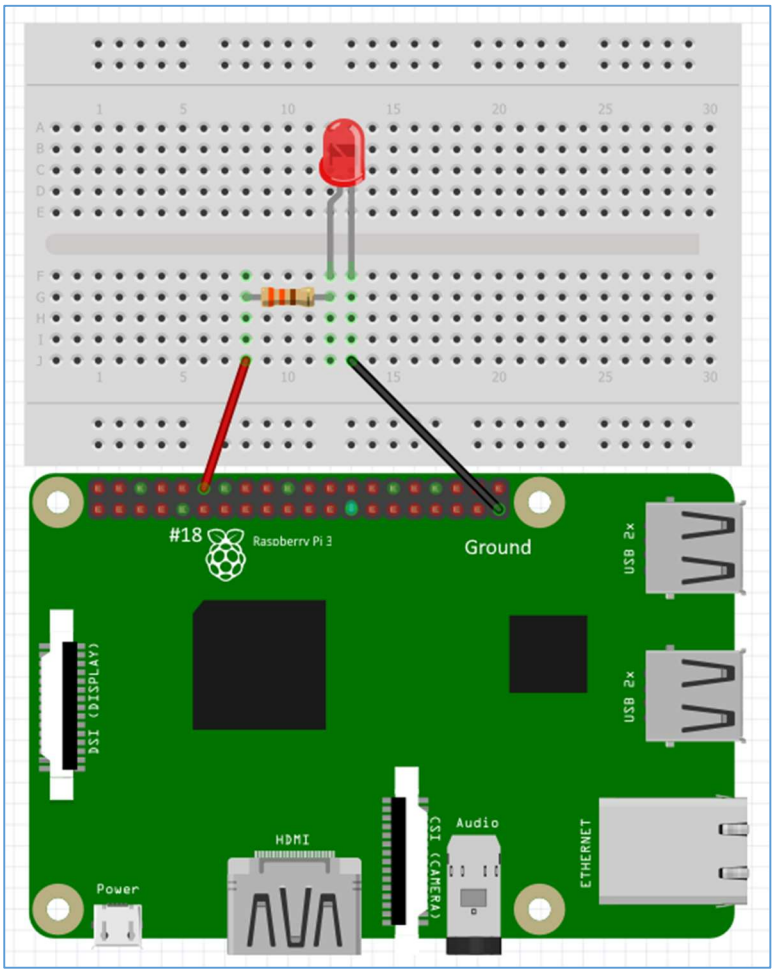
The schematic for this circuit is shown below:

Figure 37. Example 5-2: Schematic



Power is supplied with Pin #18 which has a wire that goes to the LED. Make sure that the 'long' wire on the LED is on the positive side (Pin #4). Next, the resistor is added (a resistance above 220 ohms is preferred) and it does not matter which direction the resistor is in the circuit. The other side of the resistor is connected to a ground (it doesn't matter which negative (-) it is connected).

Figure 38. Example 5-2: Breadboard Layout



Run the program with the proper connections, and power will turn the LED on and off when the Xojo buttons are pressed.

This example shows how to make a Xojo program which can turn on and off an LED light.

Index

The ‘I Wish I Knew’ series contains technical data and advice that makes sense and contains practical and numerous examples with explanations to allow you to ease into the steep programming curve. You can create interactive Raspberry Pi applications today!

This book “I Wish I Knew How to … Program Raspberry Pi 4 B Electronics with Xojo” shows how to interact electronics with the real-world. Book examples have been tested with the Raspberry Pi Desktop Operating System with Xojo version 2019 r3.1 (Xojo API2). Xojo Raspberry Pi licenses are now free! This uses the free pigpio library that is built-in to Raspberry Pi OS.

This intermediate book is written as a guide and reference to Xojo programmers who want to program the Raspberry Pi with a heavy focus on electronics. It is recommended that you have a basic desire to want to learn how to work with electronics and perform a little electronic math before using this book. Each chapter and example build on previous examples which begins with easier concepts to produce more complete examples near the end of the book. These examples require that there be a licensed version of Xojo to build the programs for Raspberry Pi – the demo version does not build programs and the registered free version does build programs.

There are 26 chapters and contains over 650 pages with more than 70 example programs.

Examples include topics such as moving a servo, 7-segment LED, Button Input, Various LED displays, precision stepper motors, Infrared Motion Detection, and more. Greatly improved speed and control of servos. Many screenshots have been added to show the results of the code with an index to help find topics quickly.

This is one of many books that can be purchased at XojoLibrary.com where many great Xojo resources are available.

Happy programming!

Eugene

Eugene Dakin MBA, Ph.D., P.Chem., is an author of Xojo and Real Studio reference materials and has many years of experience in the programming industry. Another great reference book is *I Wish I Knew How To … Program Win32 Declares for Windows*.

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