I Wish I Knew How To …

Program Raspberry Pi 2B and Raspberry Pi 3B Electronics with Xojo

September 2016 Edition (1.3)

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This command gets all of the pin number and makes a cross-reference chart for your specific type of Raspberry Pi.

Xojo GPIO Module

The Xojo GPIO module needs to be included in your project. The latest version of the GPIO module is included in the sample programs which are in the folder: “Example Projects -> Platform-Specific -> Linux -> RaspberryPi”. For your convenience, the version which came with Xojo 2015 r4 is in the Chapter 5 folder and is called “GPIO.xojo_binary_code”. If you have a newer version of Xojo, then open up the example Xojo program and copy-and-paste the latest version into your program.

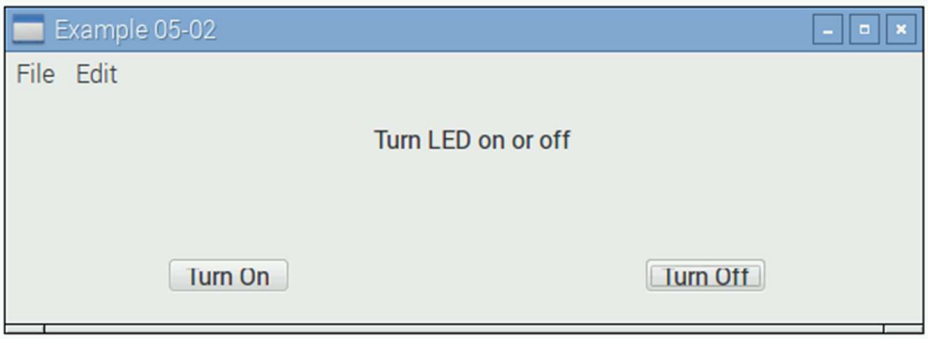
In the example ‘LED On and Off’, I have dragged-and-dropped the “GPIO.xojo_binary_code” module into Example 5-2.

Now that the supporting programs have been installed (Wiring Pi and GPIO Module), the next step is to build the Xojo programs!

LED On and Off

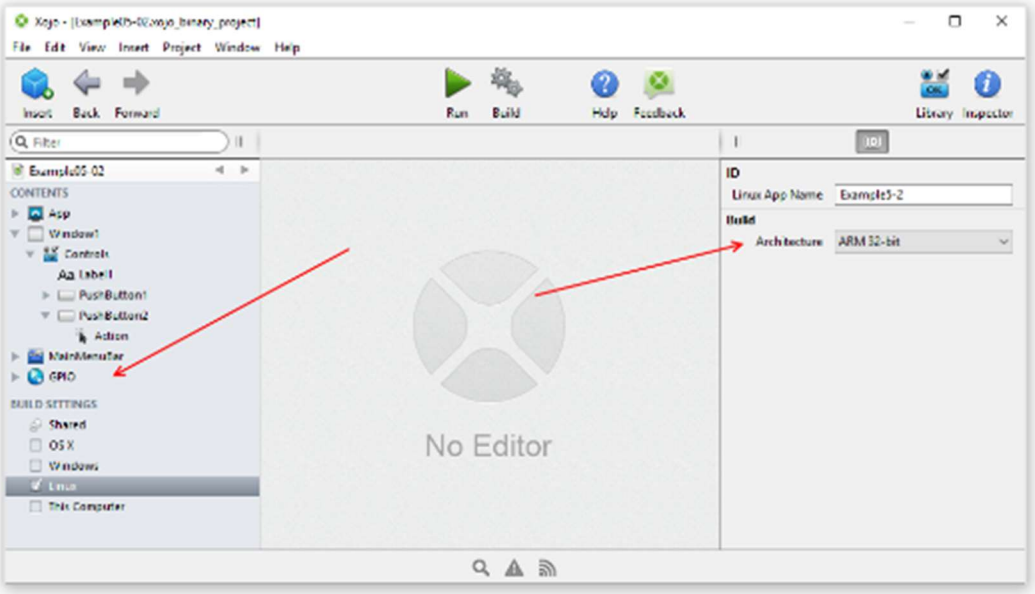
This example shows how to turn the LED light on and off by using the Xojo program. Make sure that wiringPi (installing Wiring Pi) and the GPIO module (XOJO GPIO Module) have been installed/added before building this program (see section on Setup Pi and Xojo).

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 38. GPIO and ARM 32-bit Architecture



The next step is to add the GPIO module by either copying from a new example from the directory “Example Projects -> Platform-Specific -> Linux -> RaspberryPi” or by copying from the Chapter 5 folder and pasting into the Xojo IDE for Example 5-2.

Code 6. Example 5-2: Window1 Open Event

```
//Setup the GPIO
  GPIO.SetupGPIO
```

SetupGPIO can only be called once when the program is running, and it is placed in the Window1 Open event.

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

Code 7. Example 5-2: Turn On

```
Const LEDPinNumber = 4 ' "#4" on the pinout

' Set the pin to accept output
GPIO.PinMode(LEDPinNumber, GPIO.OUTPUT)

' Turn the pin on (light the LED)
GPIO.DigitalWrite(LEDPinNumber, GPIO.ON)
```

This code sets up the GPIO with a declare in the SetupGPIO method. In our example the power (+ side) for the LED will be at pin number 4, and a constant is made. The pin to have changes is the pin number (#4) 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 8. pinMode Method[9]

```
void pinMode(int pin, int mode)
```

Pins can be set to either input, output or PWM_OUTPUT. Only pin #1 supports PWM output.

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

Code 9. digitalWrite Method[10]

```
void digitalWrite(int pin, int value)
```

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

[9] Gordons Projects: Projects, Fun and Games from Gordon @ Drogon: Functions (API), https://projects.drogon.net/raspberry-pi/wiringpi/functions/, Last accessed 23 January 2016.

[10] Gordons Projects: Projects, Fun and Games from Gordon @ Drogon: Functions (API), https://projects.drogon.net/raspberry-pi/wiringpi/functions/, Last accessed 23 January 2016.

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

Code 10. Example 5-2: Turn Off

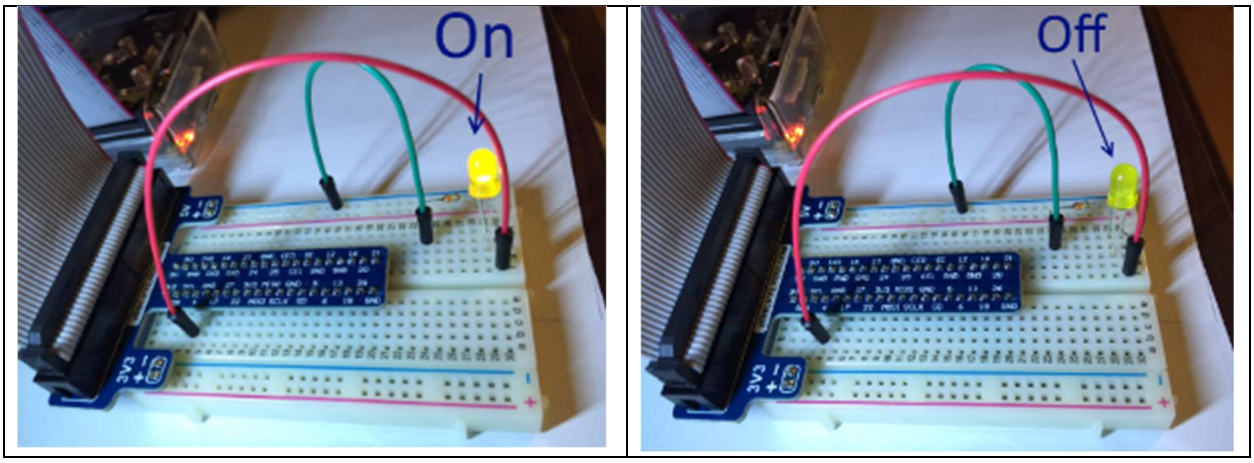
```
Const LEDPinNumber = 4 ' "#4" on the pinout

' Set the pin to accept output
GPIO.PinMode(LEDPinNumber, GPIO.OUTPUT)

' Turn the pin off (LED turns off)
GPIO.DigitalWrite(LEDPinNumber, GPIO.OFF)
```

The GPIO is setup, the pin number constant is created, the pin is set to change its output (power on or off), and pin #4 is turned off (GPIO.OFF).

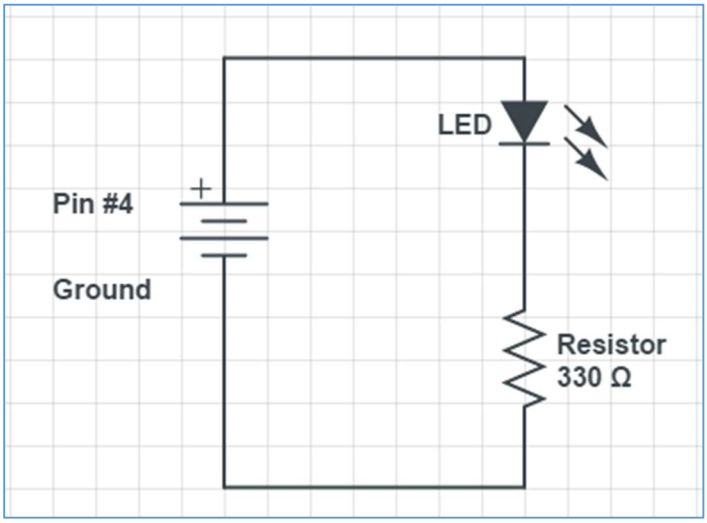
Figure 39. Pi LED On and Off



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.

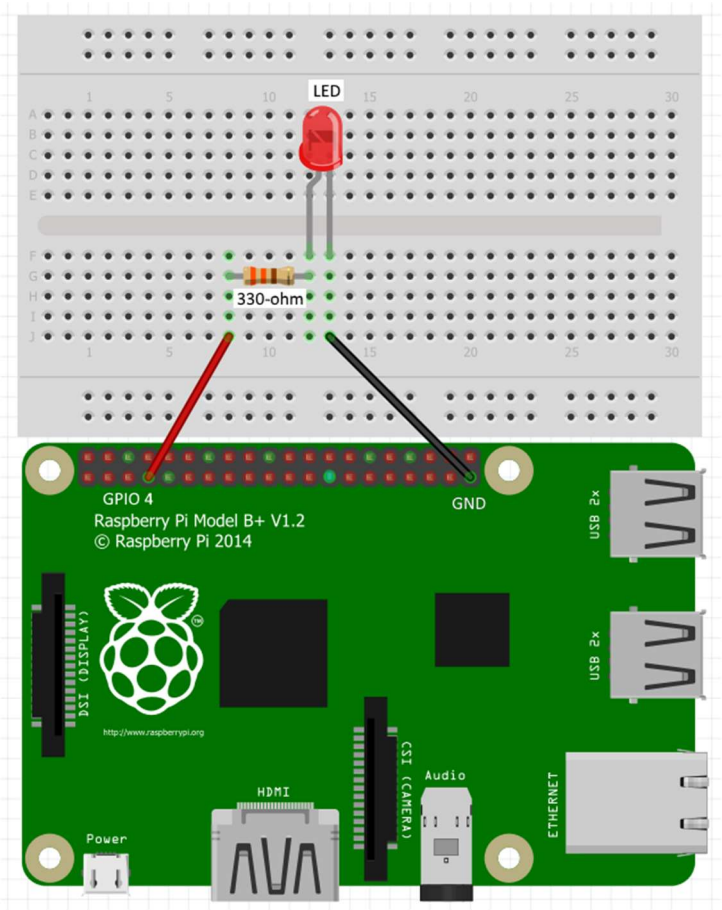
The schematic for this circuit is shown below:

Figure 40. Example 5-2: Schematic



Power is supplied with Pin #4 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 41. Example 5-2: Breadboard Layout



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 2 B and Raspberry Pi 3 B Electronics with Xojo" shows how to interact electronics with the real-world. Book examples have been tested with the Raspbian Jessie Operating System with Xojo version 2016 r1.1. A Xojo license purchase is required to run Xojo programs on the Raspberry Pi.

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 builds 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.

There are more than 22 chapters and contains over 450 pages with more than 60 example programs.

Examples include topics such as moving a servo, 7-segment LED, Button Input, Pull-up Resistor, control motor speed, Infrared Motion Detection, and more. 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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