MEP-382: Design of Measurement Systems, Faculty of Engineering, Ain Shams University, Cairo, Egypt
Spring 2015

Lab-5: Interfacing Labview with Arduino using LINX

Ahmed Okasha
okasha1st@gmail.com
LAB Goals:

Understanding:
- How Labview can be interfaced with Arduino
- Making Digital Write
- Understanding Pulse Width Modulation
- Making Analog read
Overview on measurement system

Conditioning using OpAmps (Filtering, Integration, Differentiation) www.ni.com

ADC for multichannels
LINX Library

- LINX provides an interface between LabVIEW and an Arduino.
- LINX was developed and tested using an Arduino Uno but should work with most Arduino compatible hardware.
- LINX requires a data connection between LabVIEW and the Arduino at all times.
- LINX is an updated version of LIFA (LabVIEW Interface for Arduino).
How LINX Library works?

- LabVIEW sends a packet to the Arduino.
- The Arduino processes the packet and performs the specified operation (usually some I/O).
- The Arduino sends a response packet back to LabVIEW.
- The LabVIEW VI returns and your program continues.
LINX supported devices

- Arduino: UNO, Mega, Leonardo, Nano,..
- Raspberry Pi: some models

Plus other platforms
Getting started with LINX Library

NI LabVIEW

NI-VISA

The Virtual Instrument Software Architecture (VISA) is a standard for configuring, programming, and troubleshooting instrumentation systems comprising GPIB, VXI, PXI, Serial, Ethernet, and/or USB interfaces.

JKI VIPM

JKI Software’s VI Package Manager (VIPM) makes using and distributing an NI LabVIEW add-on simple. With VIPM, it is easy to manage and share reusable VIs across multiple projects, computers, and teams of developers.

LVH LINX

Getting started with LINX Library

- In LabVIEW click **Tools ▸ LabVIEW Hacker ▸ LINX ▸ Firmware Wizard**
- Choose the **Device Family**
- Choose the **Device Type**
- Choose the Firmware Program Interface
  - *Most LINX devices use a serial interface.*
- Click **Next**
- Configure the **Firmware Program Interface**
  - *For serial devices simply choose the COM Port associated with the device.*
- Click **Next**
- Choose the **Firmware Version**
- Click **Next**
- Wait while the firmware is uploaded to the device.
- Click **Launch Example**
LED Toggle Example

1. Open a connection to the LINX device.
2. Write the value to the specified DO channel.
3. Close the connection to the LINX device.
4. Handle Errors
LED Toggle Example

Digital Output Channel

Serial Port

LED Value

Loop Rate (Hz)

Close VI
Close the connection with LINX device

Initialize VI
Used to initialize a connection to a LINX device

Digital Write VI
Write Value(s) to specific digital output channel

Simple Error Handler VI
Check for error and display its description if any exists.

While loop
Blink

- Modify the previous program to make the LED automatically blinks and repeats.
Pulse Width Modulation

- Pulse Width Modulation, or PWM, is a technique for getting analog results with digital means.
- Digital control is used to create a square wave, a signal switched between on and off.
- This on-off pattern can simulate voltages in between full on (5 Volts) and off (0 Volts) by changing the portion of the time the signal spends on versus the time that the signal spends off.
- The duration of "on time" is called the pulse width.
- If you repeat this on-off pattern fast enough with an LED for example, the result is as if the signal is a steady voltage between 0 and 5v controlling the brightness of the LED.
Pulse Width Modulation

- Arduino's PWM frequency at about 500Hz (Period: 2 ms)
Pulse Width Modulation

- Ex: To create a 3V signal given a digital source that can be either high (on) at 5V or low (off) at 0V, you can use PWM with a duty cycle of 60% which outputs 5V 60% of the time.
- Selecting a duty cycle of 80% would yield 4V, 20% would yield 1V, and so on.
UNO PWM Pins:
Exercise:

- It is required to interface a potentiometer, read its analog value (0-5v), use this value after the proper conversion as the duty cycle to control the fading (level of illumination) of a LED.
LED and Pot interface