6 LabVIEW Interface for Arduino(LIFA)

What is the LabVIEW Interface for Arduino Toolkit?

The LabVIEW Interface for Arduino (LIFA) Toolkit is a package that allows developers to acquire data from the Arduino microcontroller and process it in the LabVIEW Graphical Programming environment.

Why LIFA?

There are many reasons LabVIEW makes you more productive when using Arduino:

- Interact with your system through a graphical user interface.
- Streamline your design process with intuitive graphical programming.
- Improve your debugging experience with interactive tools.
- Leverage built in resources/functions for implementing simple to complex tasks.
- Open API allows for complete customization -- customize your programs to fit your application.

Introduction

The labview interface for arduino is a vi based API that was written and distributed by national instruments. The code also includes and arduino embedded program which must be downloaded to the device. This program which runs on the Arduino, responds to commands sent on the USB bus from the LabVIEW program. It then sends back data to the the computer via the USB.

The LabVIEW VIs provided, allow you to read back the analog inputs, control the digital IO lines and use several other features of the Arduino hardware.

Step by Step Startup

Here is a step by step process to get up and running with Arduino and LabVIEW:

1. **Install the LIFA.** The LIFA is available as a VI package through the LabVIEW Tools Network. You must first **install VIPM** from the following link (http://jki.net/vipm/download). Then download the LIFA package

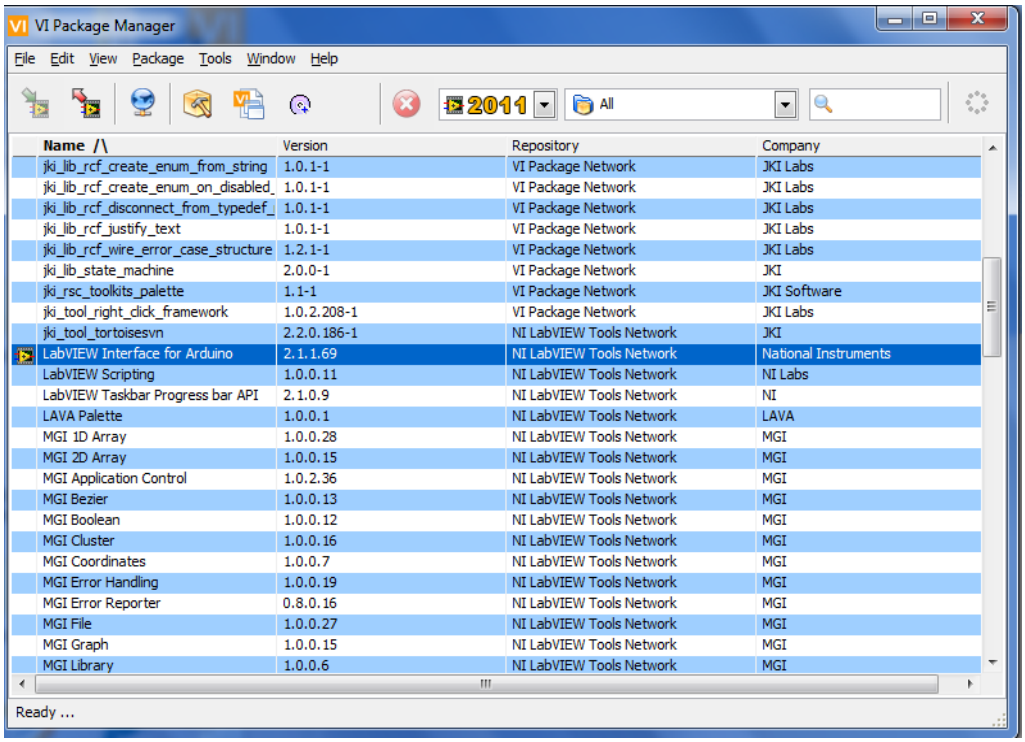

Figure.1

After select the LIFA press the install icon.

2. **Install NI-VISA Drivers.** To LabVIEW, the arduino appears as a serial instrument device. To communicate with serial instruments in LabVIEW, you need to have the latest version of the NI-VISA driver. You can get the latest NI_VISA driver from **"**http://search.ni.com/nisearch/app/main/p/bot/no/ap/tech/lang/en/pg/1/sn/catnav:du,n8:3.1637,ssnav:sup/**"**.
3. **Upload the sketch 'LIFA_Base.pde' to the Arduino.** The LIFA comes with a sketch program that must be uploaded to the Arduino before you can use the VIs to communicate with it. You must use the Arduino IDE software to do this.The sketch is located at:
    - C:\Program Files\National Instruments\LabVIEW 2011\vi.lib\LabVIEW Interface for Arduino\Firmware\LVIFA_Base\LVIFA_Base.pde

Procedures

A.load example in order to be more familiar with LIFA

From "C:\Program Files\National Instruments\LabVIEW 2011\examples\LabVIEW Interface for Arduino" open the "Arduino RGB LED.VI" the front panel will be same as figure 2.a and block diagram will same as figure 2.b

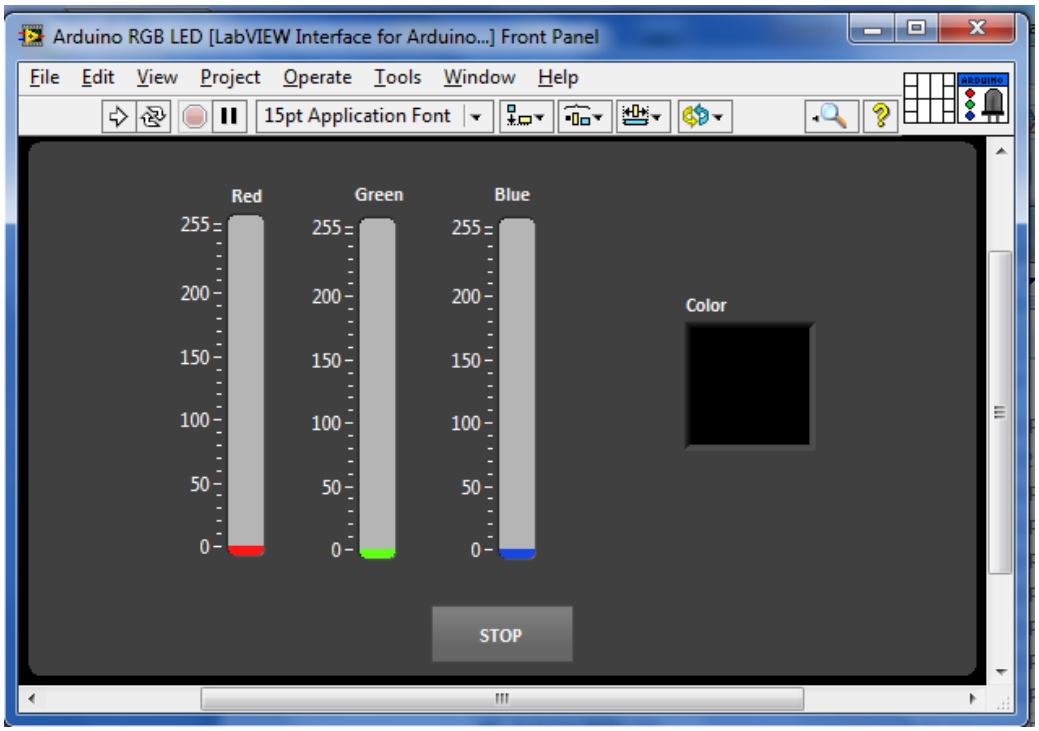

Figure 2.a

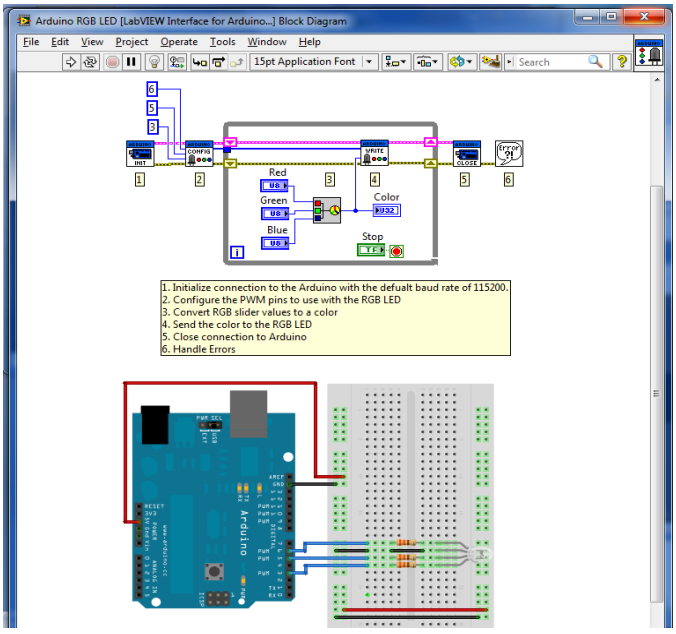

Figure 2.b

Run the application then you will note that the Tx and Rx LED start blinking, which means there is a communication start with arduino. After that change the RGB bars in the front panel and notice the RGB LED color.

B.Array example

In this example you will be use two binary arrays in as indicator and the other as control.

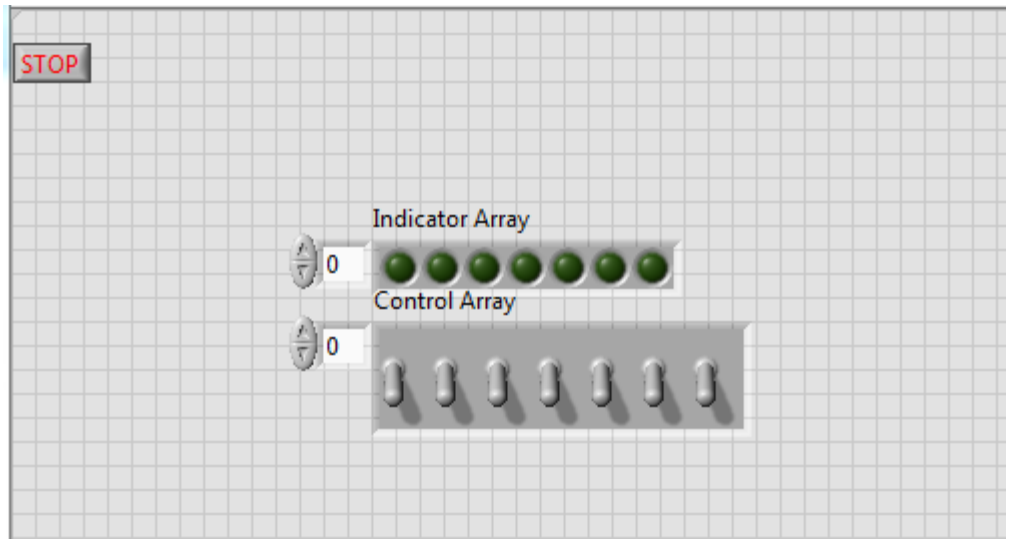

Figure.3 array example

- To add array: **Front panel >> Modern >> Array, Matrix >> array.**
- To make it a control binary array drags and drops a switch in it.
- To make it a indicator binary array drags and drops a switch in it.
- To re size the array graphically.

C. Read analog value (LDR)

Build the following LDR voltage divider circuit in to read its output voltage using arduino and print it out on the labview.

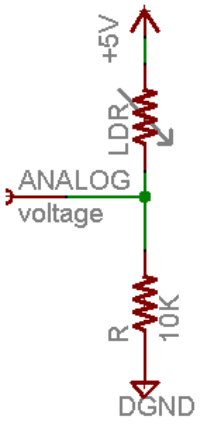

Figure.4 LDR voltage divider

Connect the output voltage of the LDR voltage divider circuit to analog bin 0 of Adriano. Then build the following example.

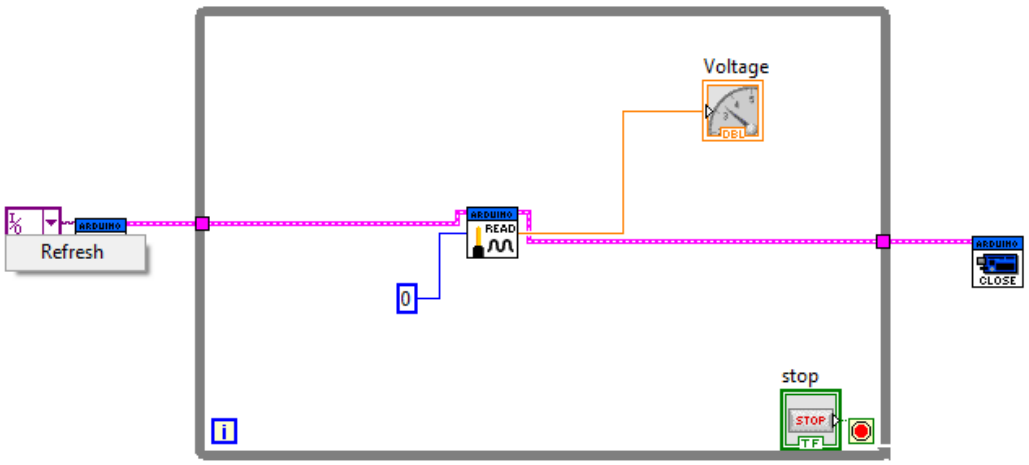

Figure.4 read example

To add the "init, close, and read analog pin" block diagram >>Arduino.

TODO: Lights detection security key (LDSK)

In this part You have to build a 12 bits light detection security key using a LDR with **Arduino and Labview** ,where you will insert the password using the LDR if it detects a light it will be a one otherwise it will be zero.

- Use for loop to get the data from arduino and store them in binary array.
- One bit every second.
- System needs a trigger to start reading. (you can use a Ok button with case structure).
- If the password is correct, then a green light is on. Else a red one is on.

Note:

LVIFA_Base folder is attached to the experiment please use them☺.

Lab Report:

1. Report as described in the Lab Policies.
2. Screen Shots of the “Block Diagram” and “Front Panel” windows where only these windows and their title bars and nothing else are visible. Points will be deducted if the components are not clearly visible in these windows or of any of the Windows screen components like the “Start Button” or “Task Bar” are visible.