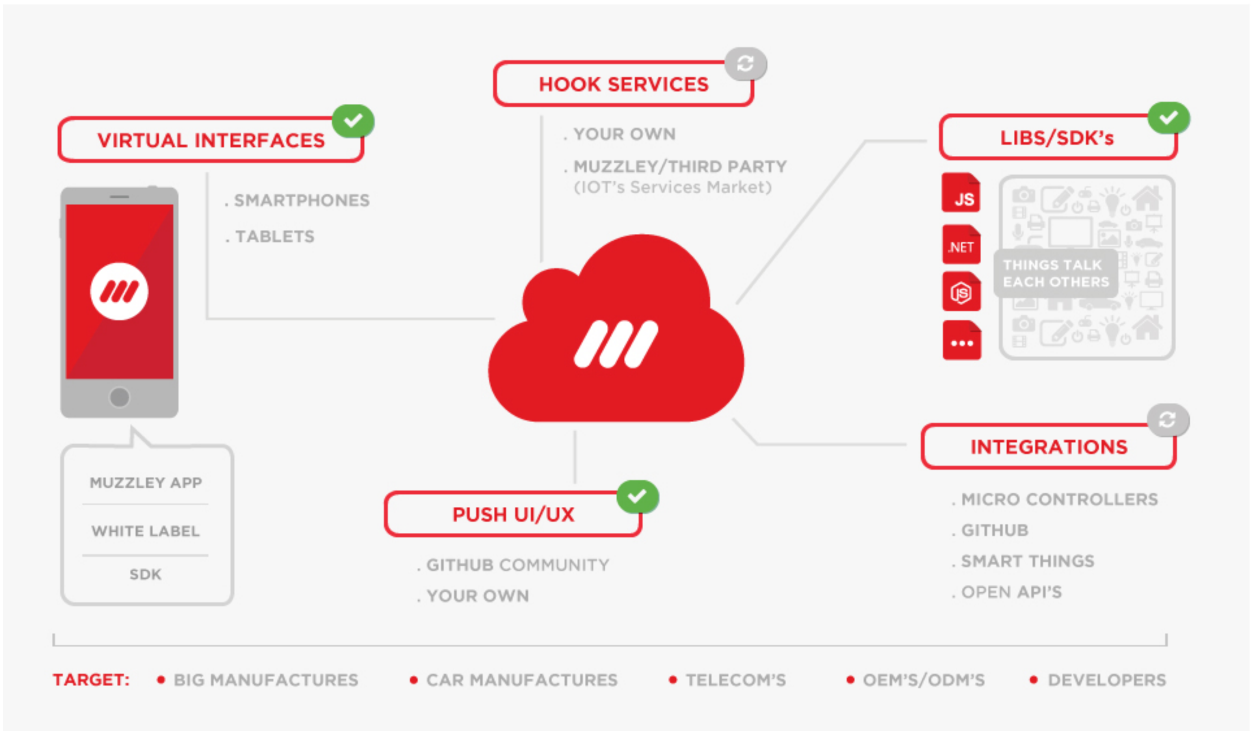
Muzzley Intel® Galileo Demos

Intro

The main goal of this demo is to explain how you can control your Intel® Galileo board and its applications with a mobile device using Muzzley. This walkthrough explains in detail how you can control a digital rgb LED strip and the Galileo board pins using a mobile device.
This demos were built with Node.js and require the Galileo to run with the Intel® IoT Devkit 1.0 image in the micro SD card.

Why Muzzley?

Muzzley is a technology that allows mobile control integration, making it easier and faster for developers, also greatly increasing the user experience.



In a very brief description, it allows you to develop your smartphone/tablet customized interface and enables a message exchange system between your application and your smartphone, making anything you need available on your device. Another good thing is that it is free for use.

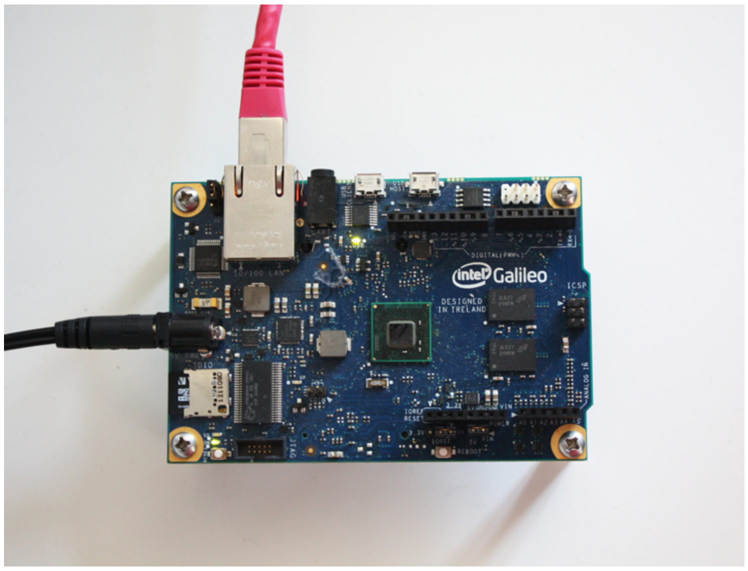
The views are loaded into your mobile devices by pairing with your application Token / QR code.

Hardware requirements

The following equipment is required in order to run the demo

- Intel® Galileo Board

  Galileo is a micro controller board based on the Intel® Quark SoC X1000 Application Processor, a 32-bit Intel Pentium-class system on a chip. It's the first board based on Intel® architecture designed to be hardware and software pin-compatible with Arduino shields designed for the Uno R3. The pins are all in the same locations as on the Arduino Uno R3. This is also known as the Arduino 1.0 pinout. Galileo is designed to support shields that operate at either 3.3V or 5V.

  (http://www.intel.com/newsroom/kits/quark/galileo/pdfs/Intel_Galileo_Datasheet.pdf)

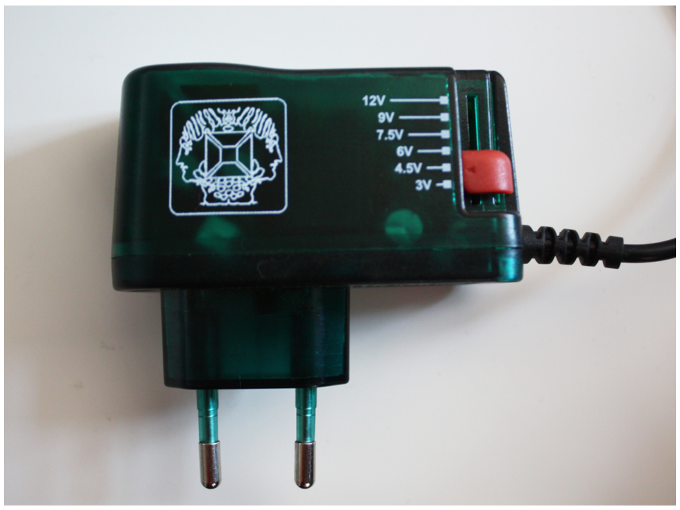
- Micro SD Card

  A micro SD card is required in order to use Linux as the operating system, it is suggested at least one with 1.5GB. If you computer doesn't have a micro SD drive you'll probably need an adapter.

- RGB Digital Led Strip

  In this demo it was used a Digital RGB LED Waterproof Strip 98 LED (http://www.adafruit.com/products/306), but it is possible to use any kind of digital LED strip as long as they use the LPD8806 protocol.

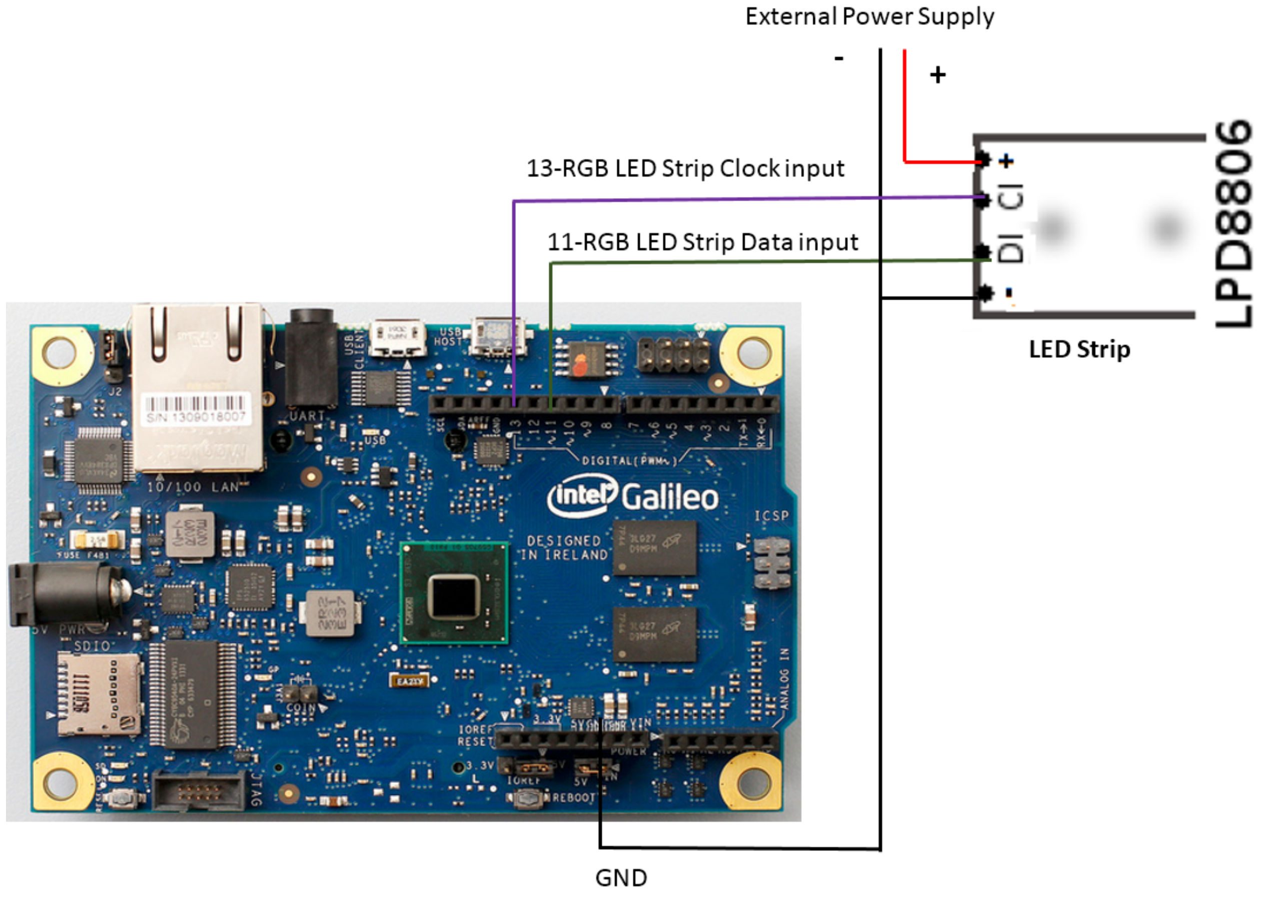
- Power Supply
  It will be necessary at least one PSU to power up the Galileo board. We also had to use another power supply (5V DC) because the strip was long and required more amperes in order to be able to flash the white colour correctly. Shorter led strips can connect straight to the on-board 5V pin.



Hardware Setup

In the image below, a diagram of how to connect the digital LED strip to the Galileo using an external power supplier is shown:

- Galileo's Clock output is pin 13 and should connect to the LED strip Clock Input (CI)
- Galileo's Data output is pin 11 and should connect to the LED strip Data Input (CI)
- The maximum recommended voltage for the digital LED strip is 5v
- If using an external power supply for the LED strip, ground must be shared between the PSU and the Galileo ground



Software Requirements

In order to run the demos you'll just need to download or create a Linux image in the SD card containing Node.js, npm and its dependencies.

Setting up the SD card with the provided image

1. Update your board firmware if not updated already (v0.7.5 minimum). You can do it in your Arduino IDE, by just clicking in the menu **Help** > **Firmware Update**
2. Insert your SD card in the host machine drive, use an adapter if necessary
3. Format the card (If using Linux check the device name with the command "fdisk -l" and then you can format it with the command “mkfs.vfat /dev/sdb1” where /dev/sdb1 is the drive given by the previous command)
4. Download the Intel® IoT Devkit 1.0 image file from http://iotdk.intel.com/images/iot-devkit-201402201605-mmcblkp0.direct.bz2
5. Unzip the downloaded file with the command “bunzip2 iot-devkit-201402201605-mmcblkp0.direct.bz2”.
6. Copy the image into the SD card using the command “dd if=iot-devkit-201402201605-mmcblkp0.direct of=/dev/sdb2”
   *If using Linux check the device name with the command "fdisk -l" where of=/dev/sdb2 is the device given by “fdisk -l”
7. Unmount the SD card
8. Insert the SD card in the Galileo and power it

Setup your app on Muzzley Cloud

1. Create your Muzzley account at www.muzzley.com if you don’t have one already
2. Create your app and name it e.g. MyLedStripApp
3. Create a widget and name it like LedWidget
4. Open the Muzzley widget editor
5. Go to git hub in directory https://github.com/v0od0oChild/MuzzleyGalileoDemos/tree/master/widget
6. Copy widget/widget.js contents to JavaScript field in the editor
7. Copy widget/widget.html contents to HTML field in the editor
8. Copy widget/widget.css contents to CSS field in the editor
9. Save your widget

Setting up the application

1. Find your Galileo IP address
2. Open a terminal and type ssh root@MY_GALILEO_IP
3. In your Galileo shell execute the following command in order to download and unzip this demo "wget http://cdn.muzzley.com/intel/MuzzleyGalileoDemos_Devkit1.0.tar.gz -O -| tar -zxvf - ”
4. Go to the project path and edit the config file by typing 'vi config.js’

5. In the editor, locate the following object:
```
ledStripe: {
  ledsNum: 97,
  spiDevice: '/dev/spidev1.0'
}
```
6. Adjust your LEDs number by changing the var ledsNum
7. Locate the following object:
```
muzzley: {
  token: "123456789.."
}
```
8. Update the token var with you app appToken (given at Muzzley website). It refers to your application token.
   By default the Muzzley activities are dynamic, If you wish to have a static activity, generate one at the Muzzley website in the tab My Apps>My App and clicking in the static activities tab and then in the button generate.
   If you are using a static activity you should also provide the generated activity to the Muzzley object:
```
muzzley: {
  token: "123456789..",
  activityId: “My_static_activity”
}
```
   Where the activityId is the the static one created in the Muzzley website.

9. Locate the object:
```
widgets:{
    wmcInterface: "abcdef-ghij-4441-aaaa-bbbbbbb3a"
}
```
10. Update the var wmcInterface to your widget id (check widget details in Muzzley website)
11. You can now start the demo using the command “node galileo.js”.

Running the demos

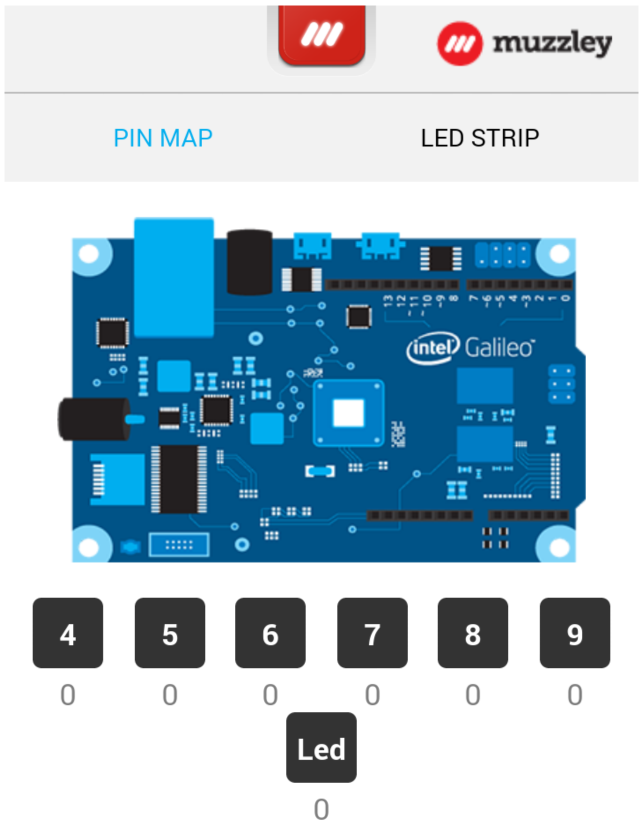
Start the demo running the command “node galileo.js”.
As soon as you watch the leds start playing an animation, it means the muzzley application has started and that you are ready to pair your device with it.

Use your muzzley mobile application and pair with the program. If you are using a static activity, you can insert the activity code straight away or scan the qrcode at http://www.muzzley.com/qrcode/my_static_activity, where my_static_activity is your static activity. If you are not using a static activity you need to find the generated activityId in the runtime output and locate the following line “[info] Connected. activityId: My_activity_id”. Insert in the Muzzley mobile app the activity id.

After the pair process you should have a visual interface in your mobile display. Multiple simultaneous participants are allowed, but only one animation will be played at a time.

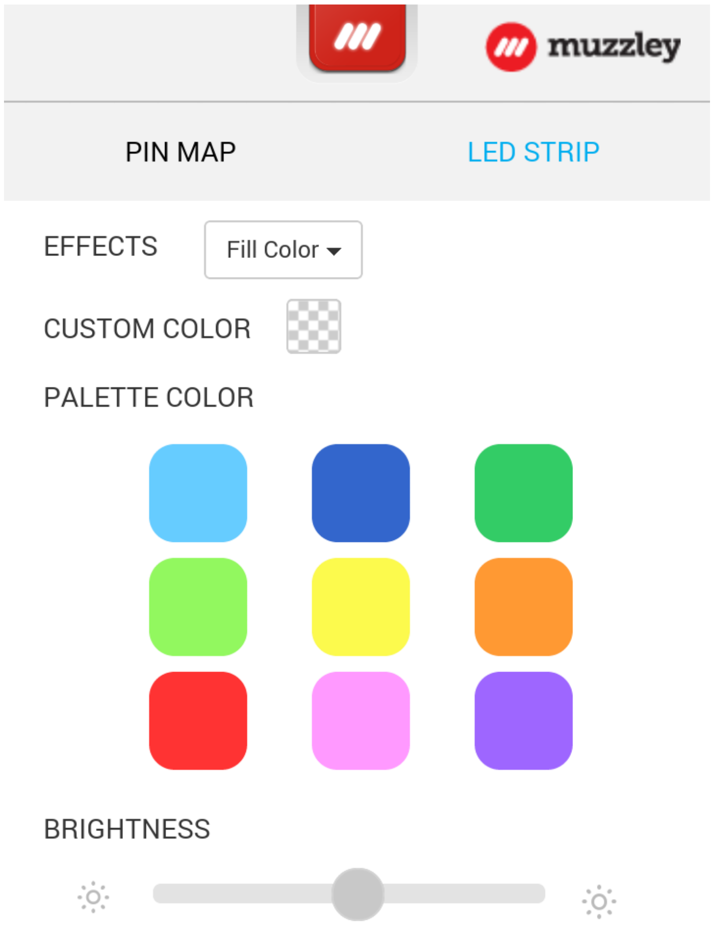
The Galileo pin debugger

This demo allows the user to read and write to the galileo board pins. Allowed values are 0 and 1 and the allowed directions are In and Out. Beware that you can only change a value if the direction is set to Out.
By default the galileo pins 4, 5, 6, 7, 8, 9 and the on-board LED were made available (GPIOs 28, 17, 24, 27, 26, 19, 3).
Clicking on a pin will show you a popup which will allow you to do such operations. You can try for instance connecting a LED to a specific pin and use the mobile device to turn it on and off setting the direction to out and switching between values 0 and 1.



The Galileo LED strip controller

This one allows the user to control a LED strip. You can fill it with colors or play some colorful animations. Picking the color, selecting an effect or adjusting brightness will trigger the animation with the selected parameters. The color palette is available on clicking the custom color button, you can try slowly dragging your finger in the color palette and watch the LED strip changing colors in real time.



Known Issues

- We are using Node.js to manipulate the LEDs. In order to make the code nonblocking, we had to make the animations asynchronous. Sometimes the animations may not run at the same speed.
- The animation queue is very small, if you have multiple participants connected and queueing a long number of animations in a short time period, the first animations in the queue will be discarded.
- In order to read the GPIO's information, we are polling them each 5s, having multiple participants at same time, may have a bit of delay updating the visual information in the other participants' views (It is possible to set the poll time shorter).

Useful links

- Project source on Github (https://github.com/v0od0oChild/MuzzleyGalileoDemos)
- Intel® IoT Devkit (https://software.intel.com/en-us/iotdevkit)
- Galileo references and pin assignment (http://www.malinov.com/Home/sergey-s-blog)