Abstract

Development environments for Maker related boards such as the Raspberry Pi and Intel Edison can be fairly challenging to setup and use. This setup becomes even more challenging in an educational context. The aim of this project is to make these development environments more accessible and more effective for students by using a readily available, open source board such as the Intel Edison and explore building a "real world" project. I have chosen an Environmental Sensing project which includes tracking water usage and correlating that with temperature, humidity, and various other sensors. The end goal of this project is not specifically to demonstrate the end use case, but to explore using different development tools, languages and online services. The actual end goal of the project will be to make concrete recommendations on “preferred” tool chains and platforms to enable students to rapidly develop projects. We will also provide a library for students to access and program different sensors through a web-based system.

Development environments for Maker and IOT related boards such as the Raspberry Pi and Intel Edison can be fairly challenging to setup and use. In an educational context, that setup becomes even more challenging. Enabling students to utilize the same environment that is setup in the lab, while they are at home, becomes even more challenging.

In order for a development/maker platform to be “scalable” and useable in an educational context the system used must be:

* Open Source
* Utilize standards based language (eg TypeScript, JavaScript for example)
* Ideally be supported by browser/cloud based development tools (eg Wyliodrin)
* Support open or free development tools (eg Intel XDK, Microsoft Visual Studio)
* Have a way for students to control sensors and output devices using high level languages
* Support development of mobile applications that can connect to the development board
* Have a simple way students can develop web services (eg sensor data can be sent to the cloud)
* Provide a simple way for students
* Allow the projects to be easily shared with teachers and students
* Recommend open source tools that allow students to quickly document their designs (from breadboard to printed circuit boards)

The objective of this project will be to utilize a readily available, open source board, such as the Intel Edison and explore building a “real world” project. The “real world project” I have chosen is an Environment Sensing project, which includes tracking water usage, correlating that with temperature, humidity and other sensors.

The end goal of the project is not specifically to demonstrate the end use case, but to explore using different development tools, languages, online services and contrast them with the bullets/framework outlined above. The actual end goal of the project will be to make concrete recommendations on “preferred” tool chains and platforms to enable students to rapidly develop IOT projects

Work breakdown (for next 3 weeks)

* Setup a test jig (see diagram)
* Create a master project document (in word)
* Interface the Intel Edison to the flow meter (pulse width modulation)
* Use the Intel XDK to develop applications, using JavaScript
* Write the code using node.js and JavaScript to read water flow
* Write code using node.js to read temperature and humidity.
* Display the readings (using JavaScript) on a LCD screen
* Research node.js, understand its history and describe its pros and cons in developing IOT applications (contrast that, for example with the Arduino).
* Research JavaScript. understand the history and contrast it with C (Arduino) for example
* Document the design, using Fritzing. <http://fritzing.org/home/>. Do a write up about Fritzing and highlight its benefits and how it would be used in an education environment. Understand how to use the “right” image/board when using Firtzing.
* Next, experiment using Wyliodrin (online tool). Will try and get the Intel Edison board up and running.
* Try and get the flow meter, temperature, humidity sensors interfaced and controlled using Wyliodrin.
* Write a report on