Lesson 7
Programming Embedded Galileo, Raspberry Pi, BeagleBone and mBed Platforms

Development Of Programs For Prototype Development Platforms

- Done using an IDE

- The cycles of edit-test-debug used

- When the simulated results show the successful test runs of the programs, then program instructions embedded

Intel Galileo IDE for Windows

- Downloadable from Galileo website
- Intel Galileo and Arduino combined features
- Similarity of IDE with Arduino
- Compatibility: Compatible with Arduino shields and similar ICSP header, serial port,
- 14 digital I/O pins and 6 analog inputs

Intel Galileo IDE for Windows

- Ethernet Library: Compatible in usability with Arduino Ethernet library and can connect with HTTP connection using standard WebClient example

- PCI Express Mini Cards: can connect to GSM, Bluetooth, WiFi cards using Arduino's WiFi library.

- USB Host Port: USB is dedicated port and usable with Arduino USB Host library and

- keyboard or mouse connection to computers.

Intel Galileo IDE for Windows

- TWI/I2C, SPI Support, Serial Connectivity and MicroSD Support

- Compatible with standard Arduino libraries.

- Linux distribution running on board: Just 8 MB flash enables node.js (for web projects)

- Sound tools: ALSA, video tools: V4L2, Python, SSH, computer vision openCV

Raspberry Pi

- RPi programming using Adafruit, BlueJIDE or NinjaIDE

- The Pi supports number of languages including Python

- Readily available libraries PyPi for programming using Python

- Supports OS Raspbian Ubuntu distribution of Linux (also known as Snappy) and has features of securely running the autonomous machines, M2M and IoT devices

Raspberry Pi

- An Rpi runs on the OSes (Windows 10 IoT Core, RISC OS, FreeBSD, NetBSD, Plan9, Inferno, AROS and additional distributions of Linux such as Raspbian Ubuntu) on the board.

- The RPi includes hardware and software provides high performance computing and graphics.

- RPi clock speed about 40 times that in Arduino and larger RAM compared to Arduino.

Rpi AdafruitIDE

- Provides a web-based development environment
- RPi connects to LAN and coding can be done using Python, JavaScript or Ruby languages.
- Provides a customised OS in place of Raspbian that functions with keyboard and displays monitor connected with RPi

Rpi AdafruitIDE

- A secure shell (SSH) for cryptographic network protocol for the Application layer
- Enables remote login and remote connections of the systems, keyboard and monitor.

BlueJIDE for Rpi

- A Java-based IDE

- Also runs the Java programs including Java 8 on RPi using PI4J library

Ninja IDE

- IDE which stands for not-just-another IDE
- Ninja enables the uses of file functions as well building of applications in Python
- It runs in cross-platform environment
- RPi as well as Linux, Windows and Mac OSX.

RPi Ninja-IDE

- Ability to create plugins, thus extend code editor functionalities, assistance for project development and load several plugins' widgets for multi-purposes.

- Code editing with multiple languages, code assistant for code completion, code navigation, web navigation and imports from anywhere, contextual menu in tabs

- Profile manager, code error finder and static error files detection.

RPi Ninja-IDE

- Code locator for fast and direct access to a class, function or file with pop up over the text fields.

- Symbol exporter, files and file usages finder, web inspector and virtual environment have been added, which can be specified in the project creation from Ninja IDE or for an existing project in Project Properties.

RPi Ninja-IDE

- Supports use of a console for embedded Python

- Console manages Python project automatically

- Allows the user to perform file management related task in the IDE itself and saves the description of project files itself.

Eclipse Pi4J

- Java coding and to program RPi board using Eclipse Pi4J implementation

RPi OS for the Applications

- Home automation and drones, for the devices which need an OS that is different from that of traditional PCs, such as Ubuntu Core (also known as Snappy).

- Snappy, a stripped down version of Ubuntu, designed to run securely on autonomous machines, M2M and IoT devices

RPi Features

- Computer like prototyping ease for developing media server and home or ATM surveillance systems IoT applications and services

- Coding in Python, C++, and the libraries

Summary

We learnt

- The RPi with 1 GB and inclusion of media processor includes hardware and software providing high performance computing and graphics.

- RPi clock speed about 40 times that in Arduino and larger RAM compared to Arduino.

- Computer like prototyping ease for developing media server and home or ATM surveillance systems IoT applications and services

BeagleBone

- BB capabilities extend using capes, just as Arduino by shields

- BB extensions provides two 46-pin dual-row expansion headers

- Motor control,

- Prototyping

- Ethernet, MicroHDMI,

BeagleBone

- VGA, LCD, USB host and USB client for power and communication and other functions.

- One can work with standard keyboard.

- OS is built-in Ångström distribution of Linux. The OS is pre-loaded with BB boards. BB

- supports autonomous machines, M2M and IoT devices.

BeagleBone IDE

- Running Cloud based IDE and Node.js web BoneScript library functions.

- Node.js is a JavaScript platform for building scripts using rich libraries and networking and real time capabilities.

- BeagleBone development supports usages C/C++ Toolchain with a gcc Cross Compiler from linaro.org and the Eclipse IDE in Windows.

mBed IDE

- A web browser is used on computer hosting the IDE that uses ARMCC C/C++ compiler at cloud

- The tools enable use of MCU firmware core libraries, peripheral drivers, networking, RTOS runtime environment, build tools, and test and debug scripts

mBed IDE

- Enables a developer to develop the applications
- IDE latest version and appropriate OS open source Eclipse and includes GCC ARM embedded tools.
- The mBed OS provides a C++ application framework with the ARM mBed community libraries to create device applications

Summary

We learnt

- Galileo IDE with Arduino Compatibility: Compatible with Arduino shields and similar ICSP header, serial port Coding in Python, C++, and the libraries

- A web based IDE Adafruit enables development of embedded device software for RPi as well as BB.

- BlueJIDE is a Java based IDE for RPi.

- Ninja-IDE is IDE for RPi enabling development of embedded device software at Windows, Mac OX

We learnt

- The Ninja enables file functions as well for building applications in Python using embedded Python console

- RPi programming using Adafruit, BlueJIDE or NinjaIDE

- BB cloud based IDE and Node.js web BoneScript library functions.

Summary

We learnt

- The mBed IDE and OS provides a C++ application framework with the ARM mBed community libraries to create device applications

End of Lesson 7 on
Programming Embedded Galileo, Raspberry Pi, BeagleBone and mBed Platforms