Lesson 1

Acronyms and Terminology

Lesson 1 | Acronyms and Terminology

1 - Acronyms

2 - Frequent Terminology









- GPIO: General purpose input/output
- MPP: Multi-purpose pins
- I2C: Inter-integrated circuit
- SPI: Serial Peripheral Interface
- PCM: Pulse-code Modulation
- UART: Universal asynchronous receiver/transmitter





- HDMI: High-Definition multimedia interface
- USB: Universal Serial Bus
- MicroUSB: Micro Universal Serial Bus
- MicroSD: Micro Secure Digital
- DC Power Adapter: Direct Current

Components -

- eMMC eMMC: Embedded Multimedia Card
- RAM
- WiFiGPS
 - ARM
 - RISC



- RAM: Random Access Memory
- WiFi: Branding term that beat out IEEE 802.11
 - GPS: Global Positioning System
 - ARM: Advanced RISC Machine
 - RISC: Reduced Instruction Set Computer



1 - Acronyms (General)

1 | Acronyms (General)

LED - Light-Emitting Diode - A device that emits light once enough power is supplied

PCB - Printed Circuit Board - A board that connects electronic components through conductive paths

BB - Breadboard - Similar to a PCB except uses wires instead of conductive paths to connect electronic components

IC - Integrated Circuit (chips) - Also known as a chip/microchip, is electronic component made up of many smaller electronic parts (i.e. the NTE987 amplifier chip)

1 | Acronyms (General)

IR - Infrared - Electromagnetic radiation (or radiant energy) with longer wavelengths than light (invisible to human eyes), has many applications in modern technology

PIR - Passive Infrared - Sensor that measures IR light around it (mostly motion detection)

SDK - Software Development Kit - Software developing tools used to create applications for a certain software/hardware platform (i.e. Android)

UI - User Interface - the means by which the user and a computer system interact, in particular the use of input devices and software.

GUI - Graphical User Interface - Allows a user to interact with software/hardware through visual icons/indicators instead of text based



2 - Frequent Terminology

2 | Frequent Terminology

Electronic - Things powered by electricity

Electromagnetism - Study of electromagnetic forces

Electromagnetic Forces - Interactions between electrically charged particles

Electromagnetic Radiation - Energy emitted from some electromagnetic processes

Electromagnetic Spectrum - The range of all possible frequencies/wavelengths of electromagnetic radiation (i.e. visible light)

H-Bridge - Circuit that allows voltage to be applied in two directions (i.e. motor clockwise/counterclockwise turn); in the shape of an 'H'

2 | Frequent Terminology

Expansion Headers - Refers to the high (white 60 pin) /low (black 40 pin) speed I/O on the DragonBoard[™] 410c

Amplifiers - Electronic device that can increase the power of a signal (i.e. increases voltage output)

Motors - Refers to electrically powered motors

Bluetooth - Wireless, short range information/data transfer

Master-slave - A relationship in which one device has control over another device (and not the other way around)

2 | Frequent Terminology

Breakouts - A PCB or wire/connector setup that makes it easier to access the pins or any other ICs on the DragonBoard[™] 410c (or any other boards)

Bus - Computer communication system that transfers data between components (i.e. a USB)

Lesson 1 | Summary + A Look Back

1 - Acronyms

- DragonBoard[™] 410c specific
- Course specific

2 - Frequent Terminology





Lesson 2

Concepts

Lesson 2 | Concepts

1 - Ohm's Law

2 - Electromagnetic Spectrum

3 - Bluetooth

4 - Operational Amplifiers













2 - Electromagnetic Spectrum

2 | Electromagnetic Spectrum



2 | Electromagnetic Spectrum

Infrared

- Near Infrared light is closest in wavelength to visible light.
 - Microscopic, size of cells
 - TVs, remotes
- Far Infrared is closest to the microwave region
 - Size of pinhead or smaller
 - Thermal heat
 - Sunlight
 - Radiator
 - Warm sidewalk

3 - Bluetooth





- Short range wireless communication
- Very convenient, fast
 - Removes the need for user intervention
 - Low power consumption
- Master-slave relationship

 connects with up to 7 other devices



4 - Operational Amplifiers

4 | Operational Amplifiers

DC coupled with high gain

Differential input with single output

Integrated circuit with many transistors

Widely used in electronic devices

Cheap and easy to use





Lesson 2 | Summary + A Look Back

1 - Ohm's Law

2 - Electromagnetic Spectrum

3 - Bluetooth

4 - Operational Amplifiers





Lesson 3

Supplemental Material

Lesson 3 | Supplemental Material

- 1 Java
- 2 Python
- 3 Breadboards







1 | Java

- Object Oriented
 - objects things that do something; has some kind of behavior, has some kind of behaviors (i.e. states)
- Android Development
- Many libraries available



- Documentation: <u>http://docs.oracle.com/javase/7/docs/api/overview-summary.</u>
 <u>html</u>
- Many teaching resources

1 | Java (OOP)

Advantages

- Code reuse/recycling
- Encapsulation
- Design Benefits

Disadvantages

- Size very large programs
- Slower than other programs

Example:

I can have an animal class. A dog would derive from an animal class, as would a cat. I can ask each animal for its age, size, etc. This info is identified as common among both animals.

I can deal with animals using common methods such as speak, eat, etc. I can add a new animal later such as a parrot and most of my code would still remain unaware of this addition. The implementation of parrot worries only about parrot particularities, while I can continue to derive the commonalities from animal class.

2 - Python

2 | Python

- General purpose, easier to read, simpler
 - nice syntax (i.e. indentation)
 - dynamic type system
 - high level language, interpreted
- Supports multiple programming paradigms (object oriented, procedural, etc)
- Tons of libraries available
- IDL3 IDE
- Documentation: <u>https://www.python.org/doc/</u>
- Many teaching resources



- Modular circuit board, solderless
- Easy access to nodes
- Not quite as clean or efficient for large projects
- Good mock up/testing tool
- Easy to obtain, inexpensive









Lesson 3 | Summary + A Look Back

1 - Java

- Android Development
- 2 Python
 - General purpose, highly readable
 - Contains comprehensive library
- 3 Breadboards
 - long vertical nodes, short horizontal
 - modular circuit board





Lesson 2

Concepts

Lesson 2 | Concepts

1 - Ohm's Law

2 - Electromagnetic Spectrum

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2 - Electromagnetic Spectrum

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3 - Bluetooth

3 | Bluetooth

Standard Bluetooth technology

- Short range wireless scheme
- Master slave communication
 connects with up to 7 other devices
- Very convenient, fast



3 | Bluetooth



4 - Operational Amplifiers

4 | Operational Amplifiers

DC coupled with high gain

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2 - Python

2 | Python

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 - nice syntax (i.e. indentation)
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- Supports multiple programming paradigms (object oriented, procedural, etc)
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