Embedded Linux:

Day 1:

Introduction to beaglebone black

-> It is a mini computer. Latest revision is Revision C.

-> eMMC(embedded multi media controller) is upgraded from 2GB to 4GB.

-> Boots linux under 10 seconds

-> Uses TI’s AM355XSOC, runs at 16Hz clock speed.

-> SOC stands for system on chip. Basically it is like RAM, Ethernet Controller, DMA Controller, SPI controller, USB controller, flash memory are placed in single chip.

-> SOC are normally used in smartphones

About Beaglebone black

1. AM335XSOC is powered by ARM cortex A8 processor uns upto speed of 1GHz.

2. 4 GB eMMC(embedded multi media controller) is basically on board memory chip. It is faster than sd card.

3. SDRAM (Synchronous DRAM): 512 MB DDR3(Double Data Rate): During booting, boot images will get loaded to this ram and other memories will execute here.

To understand about different types of RAM see below:

3.1 SRAM (Static RAM): Data is stored in transistor and requires constant power flow. Due to continious power, SRAM doesnt need to be refereshed to renever data to be stored. Refreshing data is not needed to keep data intact. It is costlier compared to DRAM and used in cache.

3.2 DRAM(Dynamic RAM): Data is stored in capacitors. Capacitors gradually discharge energy, no energy means data is lost. Periodic refresh of data is required in order to function. Used to implement main memory.

3.3 SDRAM: It is synchronized with help of clock. Everytime clock is positive triggered, capacitor gets charged and data maintain its status. We can retrieve data. But data cannot be retrieved during falling edge.

3.4 SDRAM DDR3: It collects data during falling edge. So for the same duration of clock, we get twice the amount of data per unit time. So it is called double data rate sd ram.

4. Serial (UART) pinouts:

Before this, we need to understand what is UART & SPI:

4.1 SPI(Serial Peripheral Interface)

-> When we connect microcontroller to sensor display, they talk to each other using communication protocols(SPI, I2C(Inter Integrated Circuit), UART).

-> Data gets transferred due to change of voltage.

-> SD card modules, RFID card readers use SPI to communicate with microcontroller.

-> Data can be transferred without interruption(Continous stream).

-> Device communicate in master(microcontroller)-slave(Display, sensor or memory chip) takes instructions from master.

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4.2 UART:

-> Stands for Universal asynchronous receiver/transmitter.

-> It is not a communication protocol like SPI and I2C. Main purpose is to transmit and receive data between devices.

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