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An Overview of High Performance Development Boards

Introduction: The technology that will be focused on in this paper is development boards. In particular, this discussion will focus on the lower cost high capability development boards available in the market today, and the underlying technology behind them. Then, a brief comparison will be drawn among the various development boards in the market today, and the various tradeoffs and criteria that distinguish one from the other. The areas of interest that will be touched upon are the commercial applications of these devices, the underlying technology, and the hardware or software required to utilize these devices.

Commercial applications: There are several commercial applications of high performance development boards. Within the last couple of years, development boards have been spreading like wildfire. These gadgets are used extensively by electrical engineers as a test-bed for manufacturing, quality control, and the product design phase in general. In the increasingly interactive world that we live in, there is a need for design teams, artists, and engineers to have a platform with which they can create and develop better products.[6] These development boards provide just that. A good example of a development board that has taken the world by storm is the Raspberry Pi. This device was created by the Raspberry Pi Foundation, and is a credit-card sized computer that plugs into a TV and keyboard. The Raspberry Pi functions as a bare-bones personal computer with a Linux operating system installed. The purpose of the Raspberry Pi is to encourage young people do learn how to code.[1][4] Another device that serves a similar purpose is the Odroid. The Odroid is a single-board computer created by Hardkernel Ltd. It was originally modeled as a handheld game console, but is now available in several models. The Odroid is primarily aimed at Android developers, who need a device on which to develop Android applications without the contract or data plan.[5] Yet another device that falls into this category is the UDOO, developed as a joint effort between SECO USA and Aidilab. The UDOO offers great performance on both Android and Linux operating systems. In terms of prices, the latest version of the Odroid is the most expensive at $135, the Raspberry Pi is $35, and the UDOO Quad is $129.[3] In the following section, the various parameters that distinguish each device from the other will be discussed.

Underlying technology: As mentioned above, the Raspberry Pi is much cheaper than any of the other devices of its kind. The latest version of the Odroid, the Odroid X2, is known for its extreme processing power. The Odroid X2 uses a Cortex A9 processor that operates at a clock speed of 1.7 GHz. The Raspberry Pi, in contrast, has a processor of just 700 MHz.[2] The UDOO Quad also has a Cortex A9. The A9, which was manufactured by Samsung, is a quad-core system on chip (SoC) that is also found Samsung's Galaxy S3 and Note II. Although clocked initially at 1.7 GHz, it can be overclocked to 2 GHz. The UDOO Quad and Odroid X2 both have memories

in the GB range, whereas the Raspberry Pi has just 512 MB of RAM.[7] For the above reasons, the Raspberry Pi is far cheaper than either of its two competitors. With the above features and a 440 MHz graphics chip on board, the Odroid X2 has the computational capability of a high-end smartphone from a few years ago. The UDOO is different from the Odroid in that it has a built-in Arduino as well as support for SATA I/O.[3]

Requirements for usage: The Odroid requires several peripherals in order to run Android. These include an HDMI monitor for the output device, a mouse for the input device, a MicroSD card for storage of data, and a DC voltage of 5V for the power supply. The maximum resolution that can be supported on the HDMI is 720/1080p. As mentioned earlier, the main utility of the UDOO is to run Linux. The requirements for using the UDOO are similar to that for the Odroid. Peripheral devices for both the display and input are required in order to use the UDOO. The method of booting the UDOO is the same as that for the Raspberry Pi. The SD card slot is used for booting as well as long term storage.[5]

Conclusion: The above was a brief overview of some of the development boards used in the world today. Although these devices are best used in the hands of electrical engineers or programmers, the development boards serve as a very useful and cheap middle layer between the operating system and the developer. The Raspberry Pi was the first real entry into the world of development boards. However, it lacked RAM and wireless capability. After the introduction of the Odroid-U2 and the Odroid-X2, as well as the UDOO, these shortcomings were dealt with. The development boards are very easy to use, and all the user requires to utilize them are a selection of peripheral input and output devices.

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