DESIGN SCHEMATIC OF ANDRIOD SMART BOX USING CADENCE ORCAD 16.5

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Abstract :

Android Smart box tunes TV into smart TV, which can be used as Game station, supports office works and media player and also comes with internet access. It can be used as a WI-FI router which supports WEP and WAP protocol for security. It can be used as a game station by using joystick. It consists of HDMI, USB, memories and protocols such as I2C, I2S. In this paper, we presented a complete design schematic of ANDROID smart box using Cadence ORCAD 16.5. OrCAD Capture CIS is a software tool used for circuit schematic capture. It is part of the OrCAD circuit design suite. Capture CIS is nearly identical to the similar OrCAD tool, Capture. The difference between the two tools comes in the addition of the component information system (CIS).

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1. INTRODUCTION:

OrCAD is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics and electronic prints for manufacturing printed circuit boards. OrCAD Capture CIS is a software tool used for circuit schematic capture. It is part of the OrCAD circuit design suite. Capture CIS is nearly identical to the similar OrCAD tool, Capture. The difference between the two tools comes in the addition of the component information system (CIS). The CIS links component information, such as printed circuit board package footprint data or simulation behavior data, with the circuit symbol in the schematic. When exported to other tools in the OrCAD design suite, the data stored in the CIS is also transferred to the other tool. Thus, when a design engineer exports a schematic to the circuit board layout utility, the majority of the circuit elements have footprints linked to them. This saves time for the design engineer.

2.1 ANDRIOD SMART BOX:

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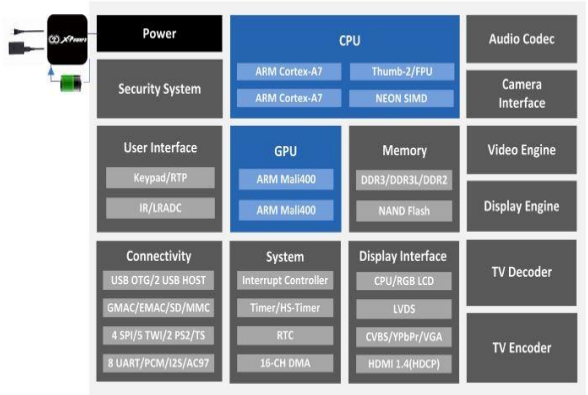

Fig.2.1 : Block diagram of andriod smart box

Block diagram of andriod smart box consists of CPU, GPU, Connectivities such as USB, MMC, I2S, system connectivities such as Interrupt controller,RTC, DMA, display interfaces like LVDS, VGA, HDMI and etc.

2.2 GPU-ARM Mali 400 :

The Mali series of graphics processing units (GPUs) are semiconductor intellectual property cores produced by ARM Holdings for licensing in various ASIC designs by ARM partners. Like other embedded IP cores for 3D support, the Mali GPU does not feature display Controllers driving monitors (such as the combination often found in common video cards).

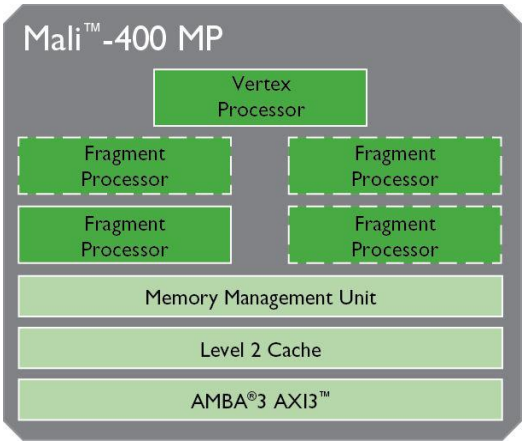

Fig 2.2: Block diagram of Mali 400

With support for 2D vector graphics through OpenVG™ 1.1 and 3D graphics through OpenGL ES 1.1 and 2.0, the Mali™-400 MP provides a complete graphics acceleration platform, based on open standards. Scalable from 1 to 4 cores the Mali-400 MP enables a wide range of different use cases, from mobile user interfaces up to smartphones, tablets and DTVs, to be addressed with a single IP. One single driver stack for all multi-core configurations simplifies application porting, system integration and maintenance. Multicore scheduling and performance scaling is fully handled within the graphics system, with no special considerations required from the application developer.

2.3 TV ENCODER:

TV Encoder provides high-quality MPEG-4 AVC, MPEG-4 part 2, and H.263 encoding to simultaneously support a variety of mobile applications (DVB-H, DVB-SH, ATSC-M/H, 3G, etc.) and various receiver types. For a better end-user experience, the Mobile TV encoder embeds a patented Grass Valley technology to automatically repurpose content. Such real-time technology enables the encoder to automatically adapt (detection of regions of interest, automatic cropping, etc.) the video content to the mobile TV display. As a cost-effective, multi-codec, and multi-stream encoder, it also features versatile inputs (analog, digital, ASI, and IP), statistical encoding, simultaneous multi-conditional-access (CA) system content protection (OSF and OMA-BCAST Smart Card profile, and DRM profile), multi-stream generation, and more

2.4 TV DECODER:

A digital TV decoder converts digital signals into analog signals; this technology allows information to be received digitally, but viewed on televisions that are not equipped with digital capabilities. Many countries have already or are in the process of switching from analog to digital broadcasting, commonly known as digital television (DTV), and the digital TV decoder Collects the digital signals from the airwaves and translates them for use on a non-digital television. With the use of a decoder, digital stations can be viewed in either standard digital format, or high-definition (HD), depending on the device and television. Other names for the decoder include digital television adapter (DTA), digital-to-analog converter box, and converter box; these devices may be purchased at most stores that sell electronic devices. Not all decoders are physical boxes, though; most newer televisions have the decoder built-in, and therefore eliminate the need for a converter box.

The Flash memory **is** an electronic non-volatile computer storage medium that can be electrically erased and reprogrammed. Flash memory was developed from EEPROM (electrically erasable programmable read-only memory). There are two main types of flash memory, which are named after the NAND and NOR logic gates. The internal characteristics of the individual flash memory cells exhibit characteristics similar to those of the corresponding gates. The Multimedia Card (MMC) is a flash memory card standard. Unveiled in 1997 by

SanDisk and Siemens AG, it is based on Toshiba's NAND-based flash memory, and is therefore much smaller than earlier systems based on Intel NOR-based memory such as Compact Flash. MMC is about the size of a postage stamp: 24 mm × 32 mm × 1.4 mm. MMC originally used a 1-bit serial interface, but newer versions of the specification allow transfers of 4 or 8 bits at a time. MMC can be used in most devices that support SD cards

3. SOFTWARE TOOL

Cadence OrCAD:

The Cadence OrCAD PCB Designer suite comprises three main applications. Capture is used to draw the circuit on the screen (schematic capture). A netlist, which describes the components and their interconnections, is the link to PSpice and PCB Editor.

PSpice simulates a captured circuit. I do not describe PSpice in this tutorial. PCB Editor (Allegro) is the application for laying out a printed circuit board. It includes an automatic router that works out the arrangement of tracks needed to connect the components on the PCB. The output from PCB Editor is a plot or a set of files that can be sent to a manufacturer.

PCB Editor replaces the earlier application, Layout, which is now discontinued. OrCAD PCB Designer is the most basic version of Cadence's Allegro suite for PCB design and much of the documentation refers to 'Allegro' rather than 'PCB Editor'.

The libraries for Capture and PCB Editor have some incompatibilities that must be corrected by fix-ups.

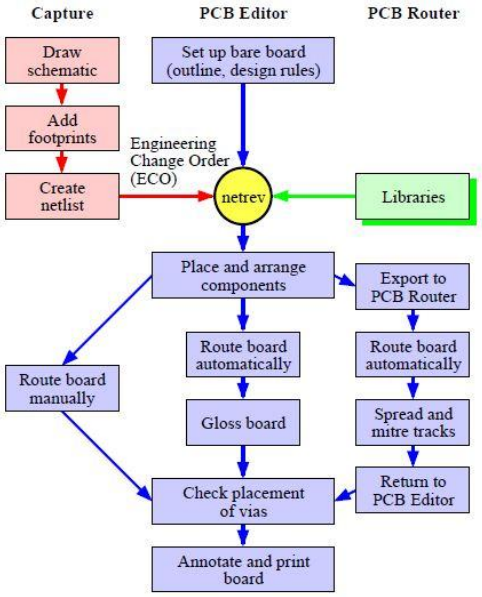

Fig3.1 : Design flow for making a PCB with Capture and PCB Editor

3.1 STARTING THE SOFTWARE:

Figure 1 shows the "Orcad Family Release 9.2 Lite Edition" folder (go into the programs menu and then look for Orcad Family Release 9.2 Lite Edition). The main components that will be utilized this semester are:

- CAPTURE CIS Lite Edition (referred to as just CAPTURE in this tutorial), and
- PSPICE Model Editor.

The CAPUTRE CIS Lite Edition is used to set up the schematics as well as simulations (it has SPICE built-in). The step-by-step procedure for this will be detailed in the rest of this tutorial. The PSPICE Model Editor can be used to create new models. However, for this course it will be typically used for looking at pre-existing transistor parameters (i.e. those Components that are supplied with the PSPICE Student version).

Fig3.2 : CAPTURE CIS Lite Edition folder

3.2 RUNNING CAPTURE:

Start CAPTURE (Go into Start, the Orcad Family Release 16.5 Lite Edition folder/menu , then click once or twice depending on the configuration of the computer).

The basic screen (as seen on the front cover of this tutorial) will be instantly seen as the Program starts.

Step C-0: Click on “file.” Click on “New project

The following selections must be done:

Ensure that the “Analog or Mixed A/D” is selected,

- the location path (if the directory already exists, CAPTURE will append it, or else
- it will create a new one) must be specified (please ensure this is on a read/write
- hard-disk or it can be alternatively on your own disk – the latter would be slower), and
- Specify a filename (this can be any name – a useful name may help you to recall it easier later).

Example: Location: H:\ENE310

Name: ENE_PRAC0

Press OK. You will be prompted to either "Create based upon an existing project" or to "Create a blank project." Select the latter (as at this stage, the earlier option may have no Fields defined). Press OK.

CAPTURE environment:

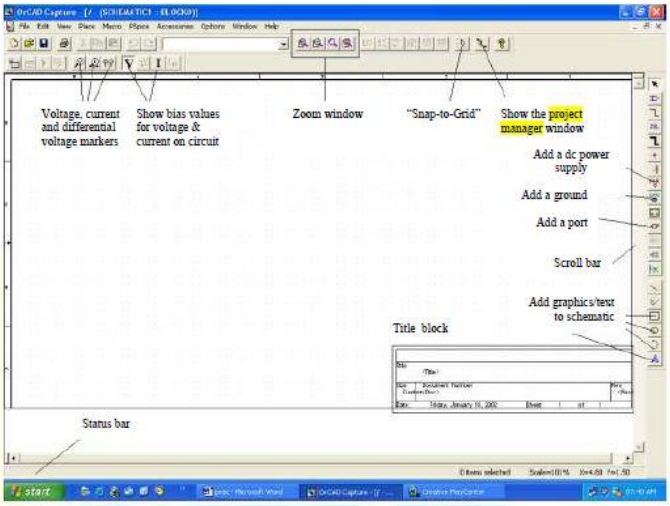

Fig 3.3 : Basic features of the CAPUTRE schematic window.

Click on project manager. To expand the "directory" structures, simply click the "+" next to the given "directory." Names may be modified, for example to change "PAGE1", simply right click on the name, click rename and rename it (for example to block0). To go back to the schematic page (figure 3), click edit page or just double click on

3.3 RUNNING PSPICE MODEL EDITOR:

Start PSPICE Model Editor (Go into Start, the Orcad Lite folder/menu (see figure 1), then click once or twice depending on the configuration of the computer).

Step P-0: Click on "file." Click on "Open" The dialog box will appear as shown Type in the path to the directory containing the PSPICE libraries:

C:\Program Files\OrcadLite\Capture\Library\PSpice

CAPTURE is often used merely for schematics; hence additional libraries may be also given in the "C:\Program Files\OrcadLite\Capture\library\" directory. However, these may not be used for simulation (they are merely symbols/"pictures"). Generally, the libraries in the PSPICE directory (C:\Program Files\ OrcadLite\Capture\library\PSpice) have complete implementations given. Step P-1: In the demo version, the EVAL and Breakout libraries may be opened for

viewing or editing. It is sometimes useful to use these as a "template" to create your own parts or libraries. Once this is opened, it will appear as in the background (list of components). A click on any component will show its

Parameters (PSPICE parameters) that will be used for simulation. For example click on Q2N2222. The f used by PSPICE for this transistor will be 255.9.

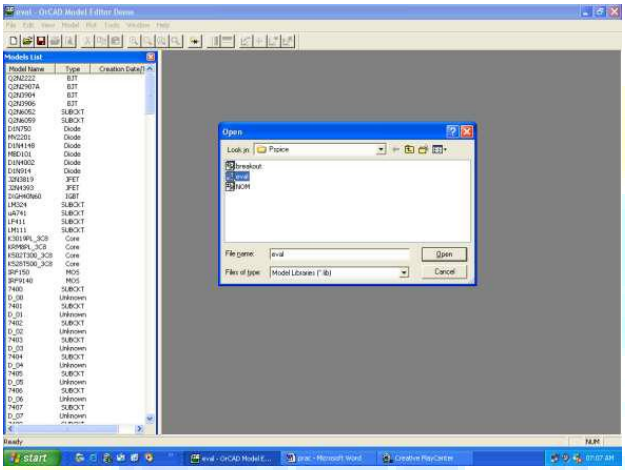

Fig 3.4 : "Open" dialog box of the PSPICE model editor.

INTERFACES Used:

Different interface used in this project are USB, HDMI, TV OUT, Speaker, microphone, headphone jack, I2C, I2S (Inter IC Sound) , Card.

Fig. 3.5 Andriod Smart Box

CONCLUSION

Thus schematic of andriod smart box is sucessfully designed using Cadence ORCAD 16.5 tool and different interfaces like USB, HDMI,MIC,TVOUT and protocols such as I2c,I2s are used in this project and power delivery of the platform is theoritically completed.

FUTURE SCOPE:

The television industry is changing so rapidly on all fronts—hardware, software, and the content we call "TV"—that consumers are rightfully cautious about investing in any new technology that might be obsolete by next year. But future-proofing electronics is a fool's game. Screen quality, the most important feature of any TV, can't really be upgraded without buying an entirely new device, and there are easier ways to keep up with the latest internet-connected apps. Samsung's cartridge solution feels like an admission that souped-up smart TVs favored by it and other manufacturers, like Panasonic and Sony, needlessly combine excellent hardware, which people do want from their TVs, with mediocre software, which they don't.

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