Computer System

1) Figure 1 shows a high level system block diagram of the computer system used for the case study.

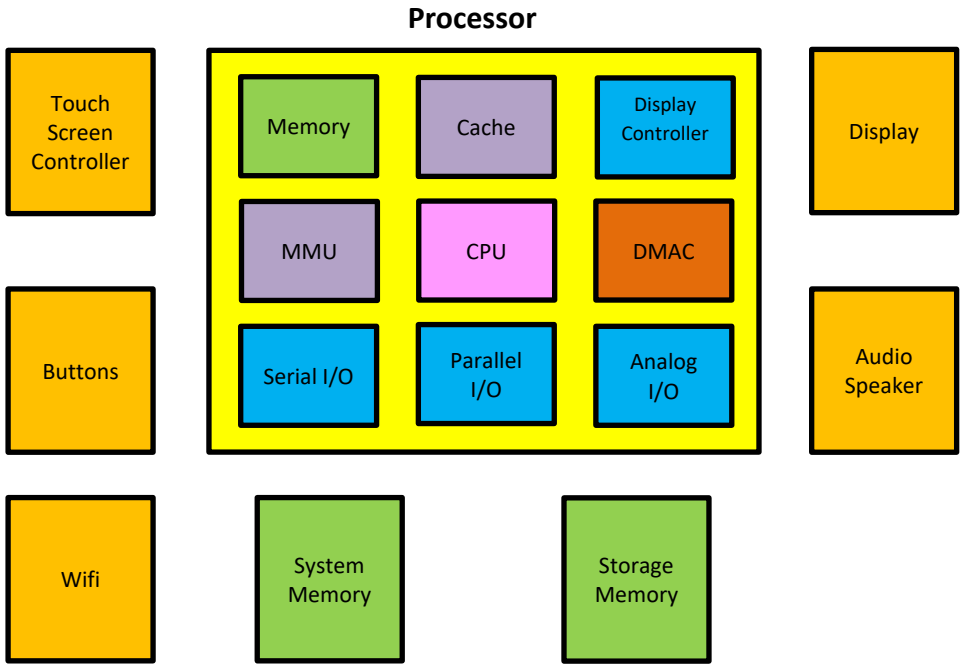

Figure 1: Computer System Block Diagram

Table 1: Processor Information

Overview	Peripheral	Electrical Interface
• Von-Neumann Architecture • 12 Data Registers (32-bit) • 256 Kbyte on-chip SRAM, 512 Kbyte on-chip Flash, • 2 Kbyte on-chip EEPROM • 4 Kbyte Cache (Data and Instruction) • 400 Mhz CPU clock • 200 Mhz External Parallel Bus interface (16-bits) • DMA Controller • Memory Management Unit	• **SPI** Max clock speed: 50 Mhz • **UART** Max baud rate: 115200 Kbps • **I2C** Max clock rate: 400 Khz • **USB 2.0 Host** Max bitrate: 480Mbps • **ADC** Max Sampling rate: 48 Khz Data width: 16bits • **DAC** Max Sampling rate: 48 Khz Data width: 16bits • **Display Controller** 24-bit bus Maximum speed 270 Mhz	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

Device/Module Information

2) Touch Screen Controller

(a) Part Number: TS001SPI

Overview	SPI	Electrical Interface
• Maximum screen size supported = 1080x720 • 8Kbyte on-chip memory • 200Hz position report rate for (x,y) coordinates • SPI interface	• Max Clock rate: 10Mhz • Full duplex operation	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

(b) Part Number: TS002UART

Overview	UART	Electrical Interface
• Maximum screen size supported = 960x640 • 4Kbyte on-chip memory • 100Hz position report rate for (x,y) coordinates • UART interface	• Max Baud rate: 115200bps • Full duplex operation	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(c) Part Number: TS003UART

Overview	UART	Electrical Interface
• Maximum screen size supported = 960x640 • 4Kbyte on-chip memory • 100Hz position report rate for (x,y) coordinates • UART interface	• Max Baud rate: 115200bps • Full duplex operation	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

3) Wifi Module

(a) Part Number: WIFI0001N

Overview	USB	Electrical Interface
• Max wireless data rate 100Mbps • USB interface	• Supports up to USB2.0, 480Mbps.	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

(b) Part Number: WIFI0010AC

Overview	SPI	Electrical Interface
• Max wireless data rate 100Mbps • SPI interface	• Max Clock rate: 50Mhz • Full duplex operation	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(c) Part Number: WIFI0015AC

Overview	SPI	Electrical Interface
• Max wireless data rate 100Mbps • SPI interface	• Max Clock rate: 50Mhz • Full duplex operation	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

4) Memory

(a) Part Number: DRAM0001-4M8

Overview	Electrical Interface
• 4 Mbyte Dynamic RAM • 8-bit Parallel interface • Maximum data strobe rate = 100Mhz	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

(b) Part Number: DRAM0002-16M16

Overview	Electrical Interface
• 16 Mbyte Dynamic RAM • 16-bit Parallel interface • Maximum data strobe rate = 100Mhz	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(c) Part Number: SRAM0001-1M8

Overview	Electrical Interface
• 1 Mbyte Static RAM • 8-bit Parallel interface • Maximum data strobe rate = 200Mhz	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

(d) Part Number: SRAM0002-2M16

Overview	Electrical Interface
• 2 Mbyte Static RAM • 16-bit Parallel interface • Maximum data strobe rate = 200Mhz	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(e) Part Number: EEPROM0001-256K

Overview	Electrical Interface
• 256 Kbyte EEPROM • SPI interface • Maximum SPI clock rate = 50Mhz • Page Size = 64bytes	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(f) Part Number: NAND0001-64M

Overview	Electrical Interface
• 64 Mbyte NAND Flash • 8-bit parallel interface • Maximum data strobe rate = 50Mhz • Page Size = 64Kbytes	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(g) Part Number: NOR0001-1M

Overview	Electrical Interface
• 1 Mbyte NOR Flash • 16-bit parallel interface • Maximum data strobe rate = 10Mhz • Page Size = 4Kbytes	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(h) Part Number: HDD001

Overview	Electrical Interface
▪ 4 surfaces ▪ 1024 tracks per surface ▪ 128 sectors per track ▪ 512 bytes/sector ▪ Track-to-track seek time = 5 msec ▪ Rotational speed = 5000 RPM • MTTF = 500,000 hours	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

(i) Part Number: HDD002

Overview	Electrical Interface
▪ 8 heads ▪ 1024 cylinders ▪ 256 sectors per track ▪ 512 bytes/sector ▪ Track-to-track seek time = 4 msec ▪ Rotational speed =10000 RPM • MTTF = 1,000,000 hours	• V(OH): 5V(max), 4.2V(min) • V(OL): 1.3V(max), 0V(min) • V(IH): 5V(max), 3.6V(min) • V(IL): 1.8V(max), 0V(min)

5) Display Controller

(a) Part Number: LCD0001-HD

Overview	Electrical Interface
• Supports up to 1920x1080 pixels display • 24-bit Parallel interface • Maximum clock rate = 200Mhz • 16Mbyte video buffer	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)

(b) Part Number: LCD0002-XVGA

Overview	Electrical Interface
• Supports up to 960x640 pixels display • SPI interface • Maximum clock rate = 20Mhz • 1Mbyte video buffer	• V(OH): 3V(max), 2.4V(min) • V(OL): 0.8V(max), 0V(min) • V(IH): 3V(max), 1.8V(min) • V(IL): 1.2V(max), 0V(min)