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Unit: Platforms

Unit Code: CMP1016

Assignment Number: 1

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Management Summary

I have specified the SBC 1586 SBC, I believe this conforms to all constraints given within the briefing, price, specification etc. I have commented on the specification of the SBC to show why each item is beneficial to the design. I have also defined the meaning of the words given to me.

Introduction:

I have been asked to research the possibility of a single board computer, to operate with a Video Surveillance camera, it will be running software which learns to recognise normal human behaviour and then to report any abnormal behaviour. E.G if a patient were to be in trouble it would be able to report it.

In order to research this I have been given several constraints, this is because the company wants to retain its existing video camera design, it has a 40,000 hour MTBF, thus is very reliable.

They wish to keep:

- ❖ CMOS Sensor
- ❖ Lens
- ❖ Focussing Mechanism
- ❖ Housing
- ❖ Power Supply

There for my constrains are:

- ❖ Maximum space of 175mm x 210mm x 30mm
- ❖ Maximum power dissipation of 50w

It must be capable of/have:

- ❖ Running Microsoft Windows CE
- ❖ 128 MB RAM (Minimum)
- ❖ An Ethernet port
- ❖ A CPU Which has floating-point capabilities

I also need to work within a budget of £1000 per camera, this must include the cost of:

- ❖ The Single Board Computer
- ❖ The Camera
- ❖ The FPGA

I have also been asked to investigate whether a dual core processor would be possible, are they available for Single Board Computers Yet, would they give any advantage etc.

Finally I have been asked to investigate whether the use of flash memory over hard drives is possible, and if so whether it would have any benefits E.G:

- ❖ Cost
- ❖ Storage Space
- ❖ Size

In order to complete this I am going to have to research the different types of single board computers that are currently available, and single out the ones that meet all the above criteria. I will then need to compare the ones I have found and work out which one is best, cost and performance wise and then make my decision as to which one I would suggest using.

Assumptions

I must also note that I am not an expert in this field, in-fact I have no prior knowledge of Single Board Computers, and this assignment does acknowledge that, and allows me to make assumptions about the project.

I therefore assume:

- ❖ That the heat dissipation of the video camera will have no bearing on the 50w limit of the Single Board Computer
- ❖ That the video camera will have a standard universal connector so that connection between it and the Single Board Computer will be possible.
- ❖ That the company will have all software necessary for the system to function correctly, and that they are compatible with Windows CE
- ❖ That the company will already have hubs, routers etc set up for the network to function correctly
- ❖ That the system only needs enough local storage (Hard Drive/Flash Drive Space) To store the Operating System, and any other programs required, and that all footage will be streamed elsewhere and stored onto tape, hard drives, DVD format and so on without needing to be dealt with by the Single Board Computer
- ❖ Due to the fact that I could not find information of the heat dissipation of the SBC I chose, I will have to assume that it meets requirements, but having looked at other SBC Computers and seeing that they dissipate usually no more than 5w this should be no problem.

Unit Pricing Breakdown

Information taken from:

<http://home.lincoln.ac.uk/LearningSystem/Chapters/ulh/default/0000061878/platforms.techreport.6Nov.pdf>

There should be a market for 250 camera units within the first year. The entire unit should cost no more than £1000 to manufacture.

Item Name	Cost
Camera	£375
FPGA	£100
Single Board Computer	£246.58
Total	£721.58

The total for 250 Units would be £180,395, leaving £69,905 remaining, more than enough to pay the £25,000 royalty to the CVS, and one can also assume that the price would decrease with the order of 250 units, as the £246.58 is for a single unit, however with or without a price decrease this unit more than fits into the £1000 per camera budget.

An indicative specification of the SBC

I have chosen the SBC 1586 Single Board Computer

Specification taken from:

http://www.embeddedsys.com/subpages/products/images/pdf/microsys_sbc1586_data_sheet.pdf

Required Specification	SBC Specification
CPU Capable Of Floating Point	Pentium 266mhz
Have Ethernet Capability	10/100 Ethernet Port
Have a minimum of 128MB Ram	Up to 256MB System Ram
Be no bigger than 175mm x 210mm x 30mm	90.17mm x 95.89mm x 15.24mm
Capable Of Running Windows CE	Capable of running Windows CE, DOS, Linux, VxWorks, RTOS
	USB Port
	Four Serial Ports
	Compact Flash Capability
	Expansion options for the future
	Cost £246.58

Price taken from: <http://www.edn.com/article/CA331989.html?stt=000&pubdate=11%2F27%2F2003>

Price converted with: <http://www.xe.com/ucc/>

Specification Notes/Comments

Pentium 266Mhz

I have chosen this Processor as it meets the specifications of the system, allowing Floating Point operations, and the ability to run Windows CE, its architecture is also like that of a desktop processor so it offers a wider range of compatibility options.

10/100 Ethernet

This port allows speeds of up to a theoretical 100mb, meaning that fast streaming of video footage is possible, which will be necessary if the system works as I assumed. It also allows easy connection of all computers to a single network.

Up to 256MB Ram

I chose this as it allows a minimum of 64MB of ram and a maximum of 256MB, I would recommend taking 256MB as this gives the system more space to work, and will make it perform much faster, the more ram a system has the better it will be able to complete tasks.

Size Of System

The size of the system is much smaller than the maximum space allowed, meaning that this will fit in with ease.

OS Ability

This system offers the ability to use many different operating systems, and while the current choice is Windows CE, should the needs of the user ever change in the future then the option is there

Expansion Options

This system also has several expansion options, meaning it can be updated in the future rather than replaced, external storage can also be installed via the flash facilities or even the USB port.

Dual Core Options

After research, I have found that it is possible to have a dual core single board computer, as Intel have just released a dual core SBC based on their desktop Core 2 Duo, this however is a very expensive chip, costing more than the SBC I have specified, and unfortunately would not fit into the £1000 budget. I believe that in the future this could have benefits for the company, allowing their computers to learn faster, however for the time being the cost is not worth the performance gain.

Flash Memory Options

I believe that flash memory would be a good option to consider, many SBC's come with internal flash memory of 1 or more MB, and offer the option to install more, and as this is quite cheap (£10 for 1GB Approximately) it will not cost the company too much. It is also a good option as the systems only need enough storage space for the Operating System and software (In my assumption). While it is not as fast as a conventional hard drive, it is much smaller, and gives off no heat (Or very nominal amounts) Meaning it would be ideal for these compact systems.

A Glossary Of Terms

A brief explanation of each of the below terms, not to exceed 50 words, also include any words necessary to your target audience, a URL may be included.

MTBF:

Mean Time Between Failure, This is the average time between failures, for example with an MTBF of 40,000 hours the system should function for 40,000 before needing a repair or replacement of parts etc.

CMOS Sensor:

Complimentary Metal-Oxide Semiconductor Sensor. This is a sensor comprised of pixels (Or Solar Cells) , which form an image when light hits, by transforming it into an electrical signal, images are made up of 3 colours. The more pixels there are the higher quality the image.

FPGA:

Field Programmable Gate Array. This is a circuit which can emulate logic gates and other functions of circuits, it can be used for a multitude of applications, and is able to be programmed, and re-programmed by a trained user when the need arises.

Single-Board Computer:

This is a silicon circuit that contains everything needed to make a computer, Memory, Processor, Ethernet etc. They are used for many applications especially when a low

power function is required in a confined space. They have application in medical, military and many other industries.

Neural Network

This is a network of computers (nodes) the Neural Network represents a brain, animal, human etc it has several neural pathways between the nodes and is able to learn, for example, in this case learning to recognise normal human behaviour.

Ethernet

Ethernet is a wired network, which supports 10, and 100mb connections, it is one of the most common methods of networking computers, and can contain many machines. They are usually connected via a router, however it is possible to connect just 2 machines via one wire.

Windows-CE

This is a cut down version of the Windows Operating System, used on machines such as PDA's, medical devices and so on. It enables the user to run programs that could normally be run on windows, while requiring less power to function. It also has specific support for SBC's.

Floating-point

Is the way in which a computer represents "real" values (numbers)

Dual-Core Processor

This is a CPU which has 2 physical cores, it enables programs to run faster, and for the computer to do more at once E.G Run a game and a movie at the same time. Modern programs support these and enable you to run programs faster than older single cores.

Flash Memory

This is a form of memory that does not need power to retain its information, it is relatively cheap, compact and gives off no heat. It stores information electronically and is able to update data store on it.

Conclusion

I found this an interesting assignment, as I had no previous knowledge of single board computers, that having been said I also found it a very challenging assignment. As the information on SBC's is quite limited, with it being a niche market only a few companies actually mass produce specified boards.

If I had have had more time (And more space to write) I would have enjoyed going into this in more detail, however I have tried to cover as much detail as possible, while keeping the information concise.

I have attempted to cover all aspects of the assignment while keeping to the restraints given to me, and hope that I have done this satisfactory to the guidelines.

Bibliography

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<http://www.xe.com/ucc/>

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