SUBASSEMBLY SPECIFICATION DOCUMENT

Version 1

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Team 5

Product: Make Me Up

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1 Introduction

The product has three main subassemblies, Kinect Camera System, Barcode scanner and PC. We implement the software operations in PC, so there is no hardware operation in it but camera system and barcode scanner have some own subassemblies.

We try to explain these subassemblies with their main functions and relations between each other. Due to Kinect camera system and barcode scanner system have their own technologies, we use their advantages by combining them with PC and connecting to software operations.

2 Subassembly Specifications

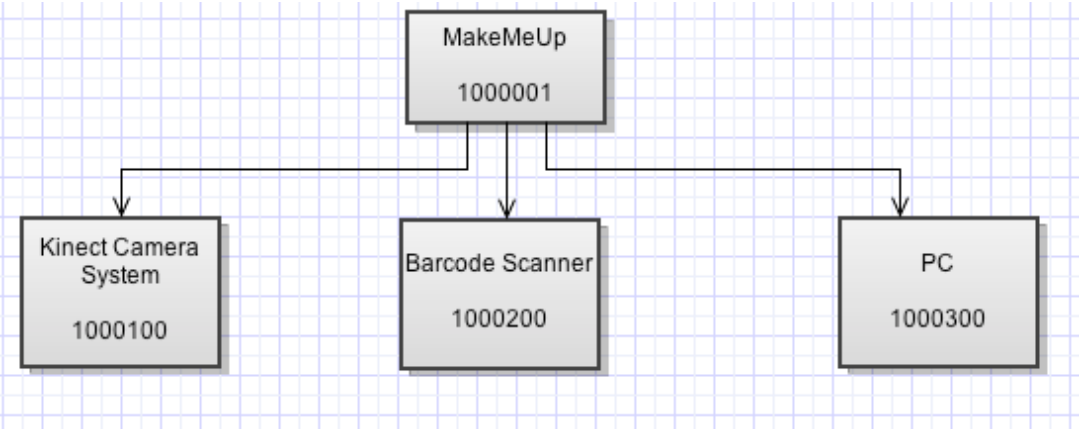

Figure 1: First Level of Product Tree

2.1 Kinect Camera System

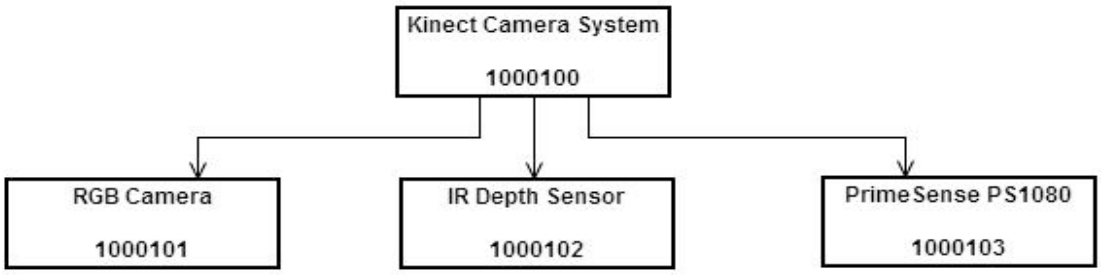

Figure 2: Subassemblies of Kinect Camera System

Kinect Camera System has three own subassemblies shown in Fig 2. We supply these operations by Kinect technology.

The visible video sensor and depth CMOS sensor are located next to each other, enabling the depth map to be merged with the color image. The PS1080 performs a registration process so the color image and depth information is aligned properly. The PS1080 takes the results from the image sensor and determines the differences to generate a depth map. The resolution of the depth map is 1024 by 758 (VGA), but the CMOS sensor has much higher resolution. The image that can be captured by the hardware is actually 1600 by 1200, which is necessary to provide the depth map. Otherwise, there would be insufficient resolution to detect changes in the position and size of the projected IR dots.

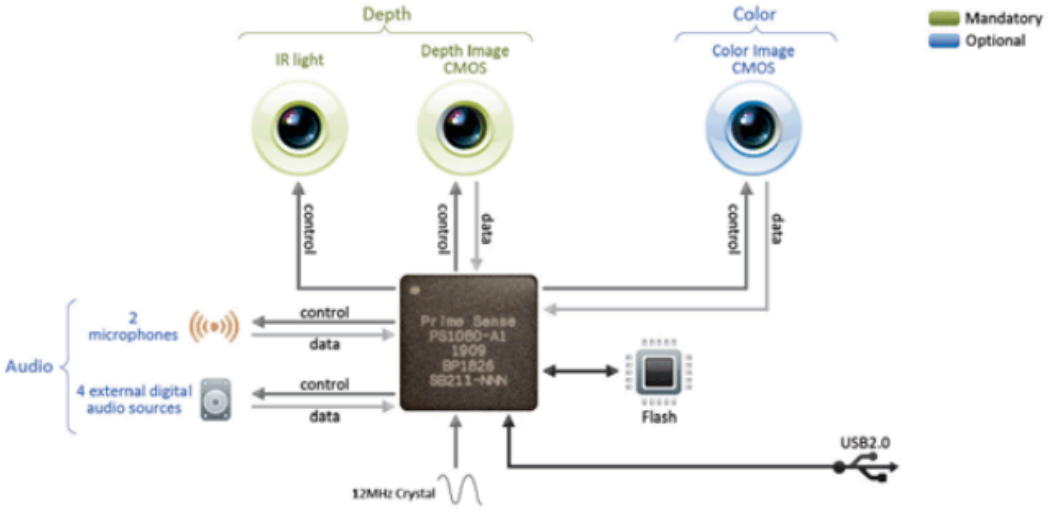

Figure 3: Block Diagram of Kinect Camera System

The OpenNI (natural interaction) organization provides a framework and application programming interface for dealing with devices like Kinect. OpenNI addresses a range of devices including visual and audio devices.

- Field of View:
  Horizontal field of view: 57 degrees
  Vertical field of view: 43 degrees
  Physical tilt range: ± 27 degrees
  Depth sensor range: 1.2m – 3.5m

- Data Streams:
  320×240 16-bit depth @ 30 frames/sec
  640×480 32-bit colour@ 30 frames/sec

- Power Supply: Supplied by Kinect port or AC power adaptor

- Data Connection: USB 2.0 Interface

- Operating temperature : 5 - 35 degrees Celsius.

- Weight of camera system : 1.5kg(+-0.5kg).

2.2 Barcode Scanner

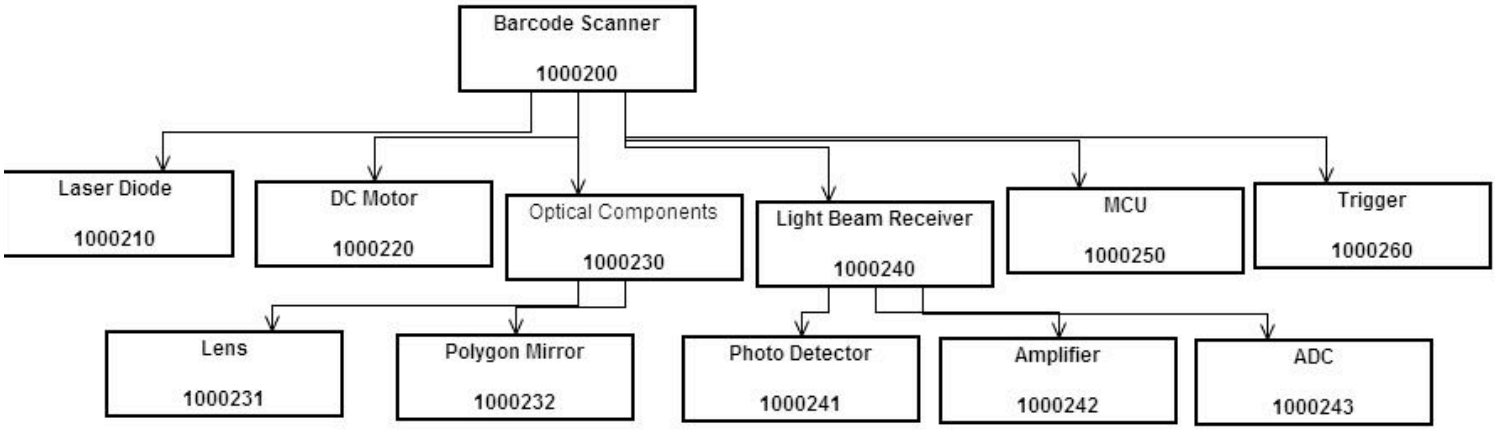

Figure 4: Subassemblies of Barcode scanner

Barcode scanner is composed of a laser diode and a DC motor with their corresponding driver circuits, optical components (lens, polygon mirror), light beam receiver circuit (photo detector, amplifier and ADC), MCU, interface circuit (USB interface), trigger circuit and power management.

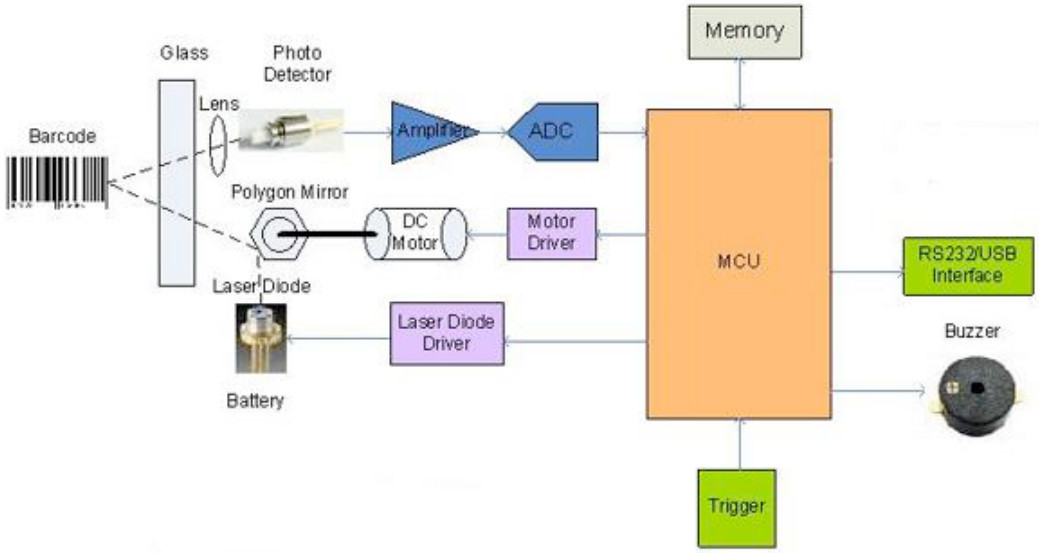

Figure 5: Block Diagram of Barcode scanner

When a consumer shows a cosmetic product to the glass of barcode scanner, the trigger circuit sends out a trigger signal to MCU, which will then instruct the driver circuit to drive laser diode to emit laser beam, meanwhile the motor driver powers the motor to rotate the polygon mirror. The laser beam is deflected periodically by the rotating polygon mirror. When the deflected laser strikes the black and white bars, it is reflected back and received by the light beam receiver circuit. This circuit will process the received laser signal and send out digital signal to the MCU. The MCU decodes the signal and stores the barcode information in the internal memory. We transfer this information to our PC and product database through USB interface.

- Data Connection: USB 2.0 Interface

- Environmental:
    Operating Temperature: 0 – 40 degrees Celcius
    Light Level: Max 100,000 Lux

- Power:
    Input Voltage: 5 VDC (+- %5)
    Power consumption: 1,4 watts
    Operating current: 280 mA

- Weight: 200g – 500g

2.3 PC

PC includes our main system, which operates software part of project. However, software part is very wide because of image processing and 3D rendering. As electronic students, we plan to work for image processing to edit the image we get from camera and transfer that version to display. CS students also work at displaying the 3D-rendered image. PC provides us a screen for display besides software operations.

There are some qualifications of PC system which our subassemblies requires to work efficiently.

- Windows 7, Windows 8, Windows Embedded Standard 7, or Windows Embedded POSReady 7
- 32 bit (x86) or 64 bit (x64) processor
- Dual-core 2.66-GHz or faster
- Dedicated USB 2.0 bus
- Min 2 GB DDR3 RAM

2.4 Power Specifications

The subassemblies of product can connect to PC by USB 2.0 interface and this interface provide power for some parts of these systems. Cameras in Kinect device can work with the power from USB but PrimeSense PS 1080 chip requires an external power supply so there is an AC adaptor for Kinect device. Other subassembly barcode scanner system can work as connected to PC by USB interface.

- 65W universal
- Operating voltage and current : 100-240V ~1.5A
- Operating frequency: 50-60Hz
- Operating temperature: 5 - 45 degrees Celcius

3 References

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