Assistant Eye

Subassembly Specification

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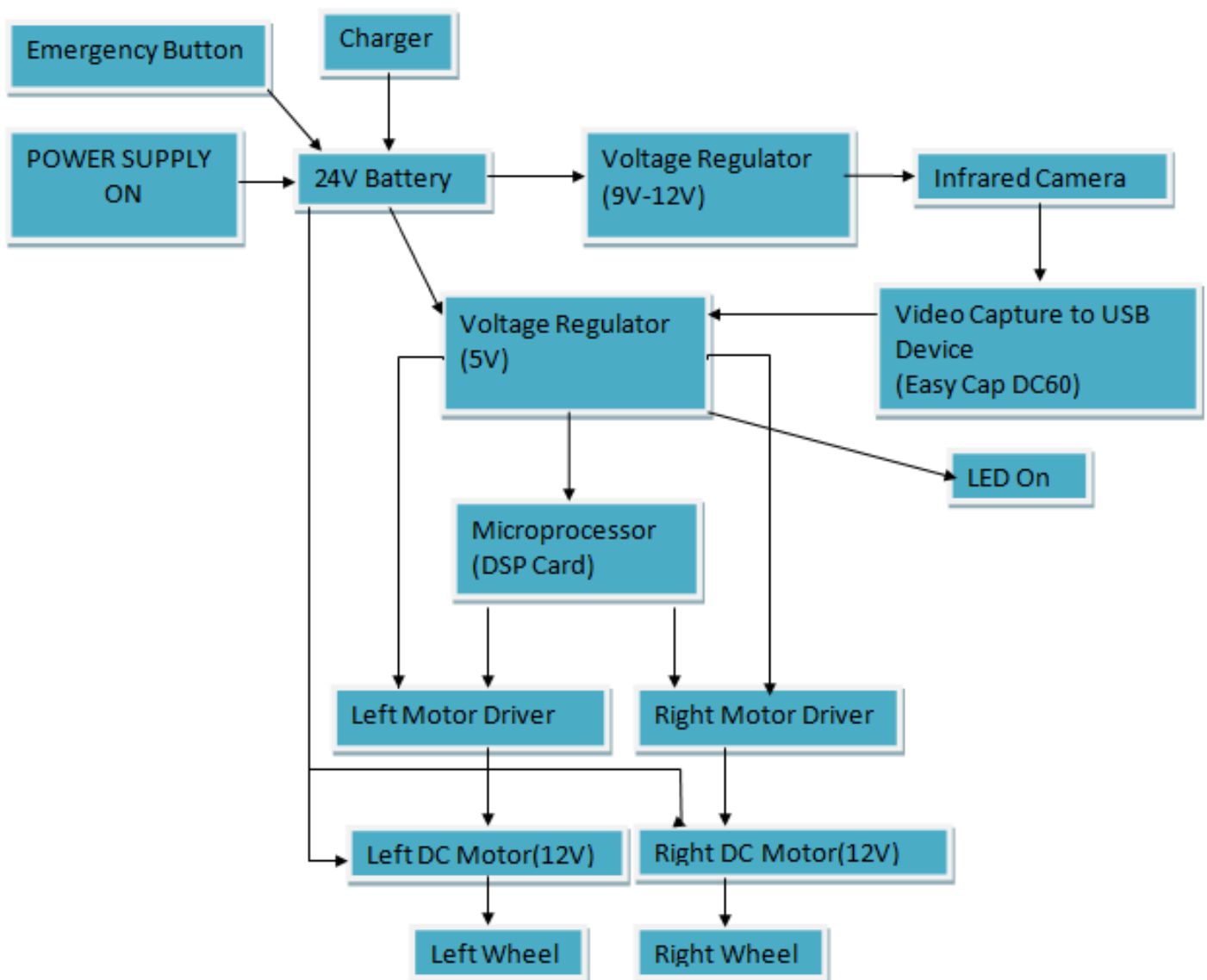
Melik Koray Uster

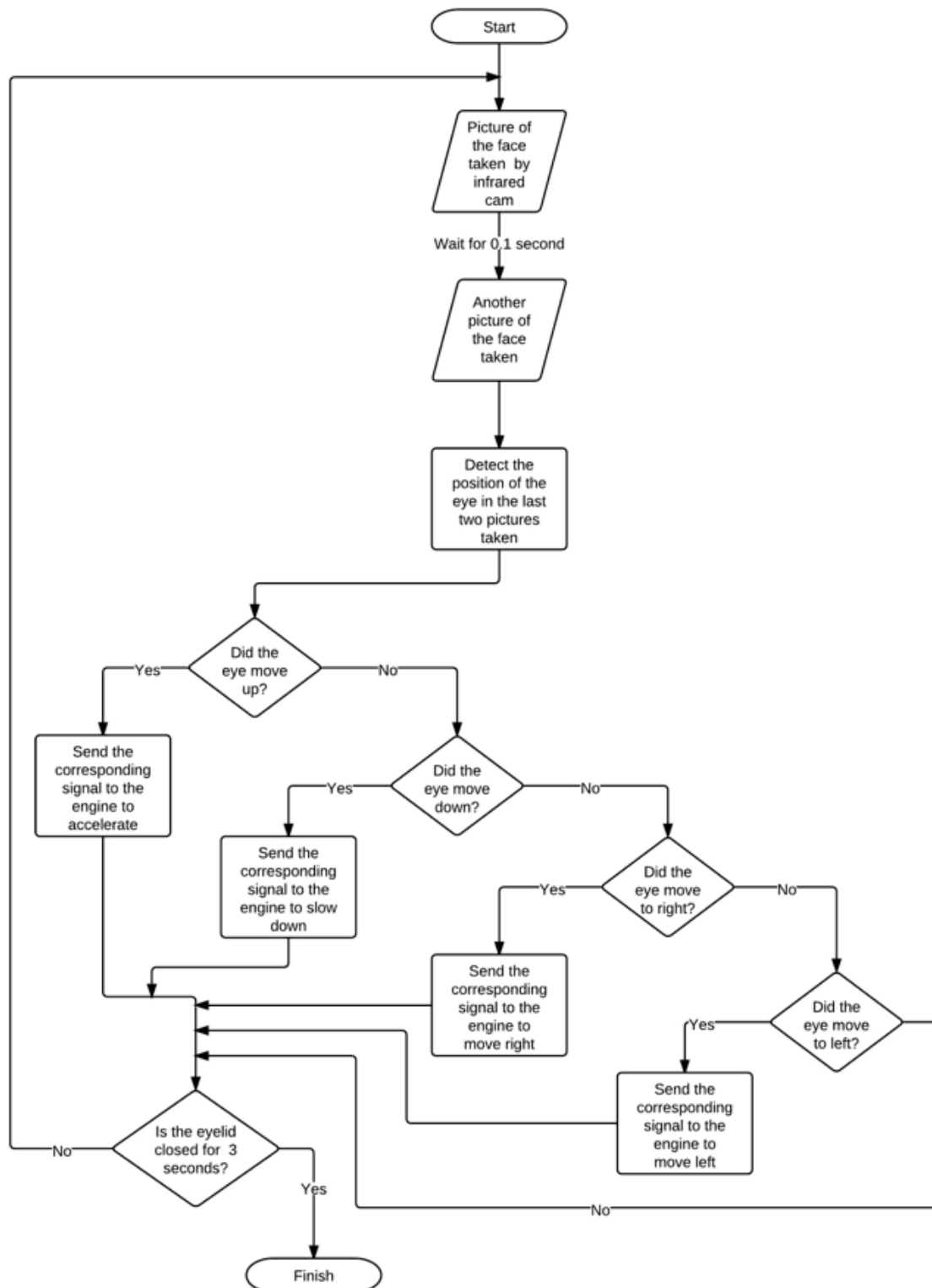Caglar Varan

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Block Diagram

FlowChart

Start

Picture of the face taken by infrared cam

Wait for 0.1 second

Another picture of the face taken

Detect the position of the eye in the last two pictures taken

Did the eye move up?
— Yes → Send the corresponding signal to the engine to accelerate
— No →

Did the eye move down?
— Yes → Send the corresponding signal to the engine to slow down
— No →

Did the eye move to right?
— Yes → Send the corresponding signal to the engine to move right
— No →

Did the eye move to left?
— Yes → Send the corresponding signal to the engine to move left
— No →

Is the eyelid closed for 3 seconds?
— No →
— Yes → Finish

Subassembly Specifications

DC Motors

In order to move the wheelchair, we will need 2 dc motors and the latest calculations that we made shows us, approximately 0,1 kw dc motor will be enough for us to move the wheel chair. We are going to use 2 servo electric motors which have maximum output power 94 watts. We require a 12v output for the circuit, but our DC motors will have 36 v typical voltage to work on, which can easily help us. The most important specification we need is the torque of the DC motors. We require to carry a human up to 100kgs and a wheel chair approximately 120 kg. Our DC motors will have maximum peak torque 1,44 Nm, which will deal with load.
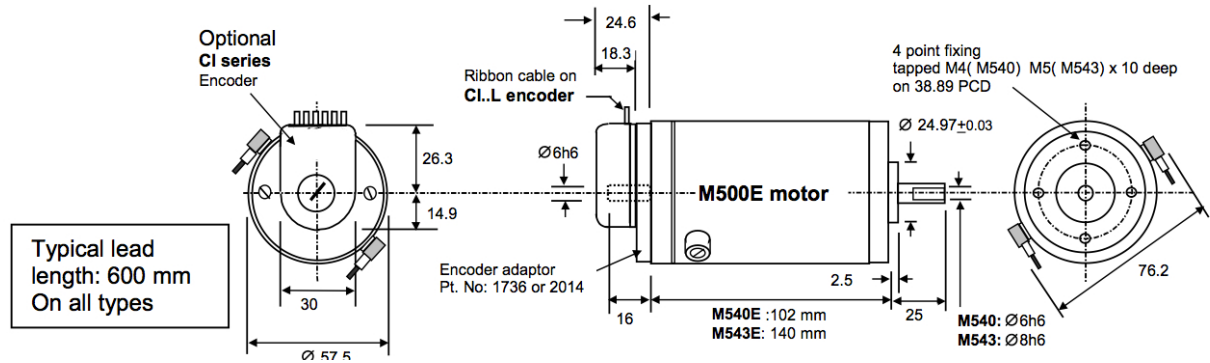
Emergency Button

We will be using SSA-EBP-02L emergency stop button which can be pushed to stop the operating system. This will be placed at the back side of the wheelchair, and can be used for anyone who is close to the person sitting on the wheelchair. It requires 0,8 kg operating force to be activated, so it can be pushed easily by anyone. Its mechanical life is 300.000 operations, which will not cause any problems in terms of fatigue. In order to satisfy safety requirements, its adapter and cables will be placed and fixed to the mounting surface by using incorporated screws, which will also save us from extra space. Important specifications are that it requires 13 Volts DC or 15 Volts AC voltage to operate and also it works in -25° to +60°.

The dimensions for the button is:
Height: 8cm, Width: 7cm, Depth: 6.5cm

Batteries

We require a battery to feed 2 DC motors which work on 12v and an infrared camera works on 9-12v. We can set a parallel connection between them and we can set the operating voltage as 12v.
Specifications:
Voltage: 24v
Capacity: 15 AH
Battery Size: 270*140*75 mm
Net weight : 5kg

IR B/W Bullet Camera

One of the major components of the product is the infrared camera. When the researches are taken into account it is decided that using a bullet(lipstick) infrared camera will be the most appropriate one due to its being small and useful. We will consider B&W infrared cameras with an IR lens permanently installed. Camera is inside a small, Lipstick sized tube 2.5 inches long x 0.8125 inches diameter. Power supply required is 9-12 VDC regulated. 0.1 Lux, >512 lines resolution. Included with the camera is a permanent swiveling mounting bracket, mounting screws, and integral power and video connectors.With respect to the given information for the camera, if its damaged by using an improper power supply, then camera cannot be repaired or replaced. Therefore, its voltage supplier should be well adjusted. There exists two options that are given below table.

IR B/W Bullet Camera Frequency Range Options

715 nm / 780 nm / 830 nm / 1000 nm / XDP

	B&W Bullet	B&W Bullet Pinhole
Model	XNiteBtBW	XNiteBtBWPin
Infrared Capable	None / 715nm/ 780nm/ 830nm / 850nm / 1000nm / XDP Optional	Yes
Image Sensor	1/3 CCD BW	1/3 CCD BW
Video Format	B/W EIA or CCIR	B/W EIA
Operating Voltage	DC 9V to 12V	DC 9V to 12V
Power Consumption	110 mA	110mA
Gamma	0.45	0.45
S/N Ratio	> 30db	>48dB
Sensitivity	1.0 Lux	0.1 Lux
Resolution	>420 TV Line Horizontal	> 420 TV Line Horizontal
Video Out	75 ohm, 1Vp-p Composite	75 ohm, 1Vp-p Composite
Operating Temperature	-10 C to +50 C	-10 C to +50 C
Focal Length	3.6mm	3.6mm
Field Of View Angle	Diagonal 92 degrees	Diagonal 92 degrees
Weight	90 Grams	100 Grams
Video Connector	BNC	BNC
Dimensions	20.7mm (diam) x 59mm (long)	24mm (diam) x 50mm (long)

EasyCAP DC60 - USB 2.0 Audio/video Creator Capture High-quality Analog Video

Infrared camera component output should be transformed to usb in order to make camera able to communicate with DSP card.

- Provides a link between a PC and a video device with RCA connector or S-Video connector, such VHS, VCR, DVD
- USB 2.0 interface, plug and play. Support brightness, contrast, hue, and saturation control. Capture audio without the sound card.
- Support All Video Formats: DVD+/-R/RW, DVD+/-VR, and DVD-Video. Applying to internet conference / net meeting. Support NTSC, PAL Video format.
- Video input: One RCA composite, One S-Video. Audio input : Stereo audio (RCA)//Dimension (L)88mm x (W)28mm x (H)18mm. USB bus power.
- Package Contents: 1 x EasyCAP USB 2.0 Video Adapter with Audio, 1 x USB Cable, 1 x Quick Installation Guide, 1 x CD-ROM

LED

There will be a simple LED directly connected to the 5V voltage regulator in order to indicate the user whether the system is on or off. It drains about 20 mA since it is designed for viewing in direct sunlight and room light.

DSP Card

- It provides a computing power up to 1.2 GHz clock speed and fast-access two level large data caches.
- DSP supports multiple arithmetic instructions execution and hardware controlled looping which largely used in image processing therefore provides significant performance in such tasks.
- It must enables to execute the eye-tracking software in almost real-time.With its optimal architecture for complex arithmetic and matrix calculations, highly complicated tasks of the system that will be used in the software, will be able to performed in a reasonable time.
- The dimensions of the card must be fairly small that resolves the portability issue.

- It should work on around 12V.

- It can have 44.1, 48, 88.2, 96, 176.4, 192kHz sample rate support

- High-bandwidth x1 PCI Express (PCIe) card (can be used in x1/x4/x8 and x16 slots, PCIe 2.0 compatible)

- The life of the DSP card must be longer than 2 years of continuous usage.

- Multi-card support for up to 8 cards - mix and match up to 4 UAD-2's and 4 UAD-1/1e/Xpanders in one system/group

- UAD-2 individual plug-in instances per DSP chip will vary based on the plug-in combination selected with the average session being around 2.5x

- Real-time and faster than real-time processing for mix bounces

- High-speed memory bus for running reverb/delay type effects.