Enclosure Block Validation

Block Owner: Abdulla Al-Ansari
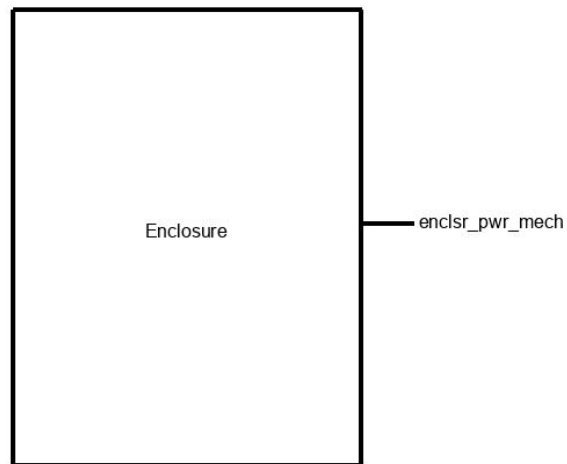## Date: Feb-28-2021

Design Details

Figure 1: Black Box Diagram of Enclosure Block

Length = 6 inches

Width =2.5inches

Depth =2inches

Figure 2a: Front View with android phone

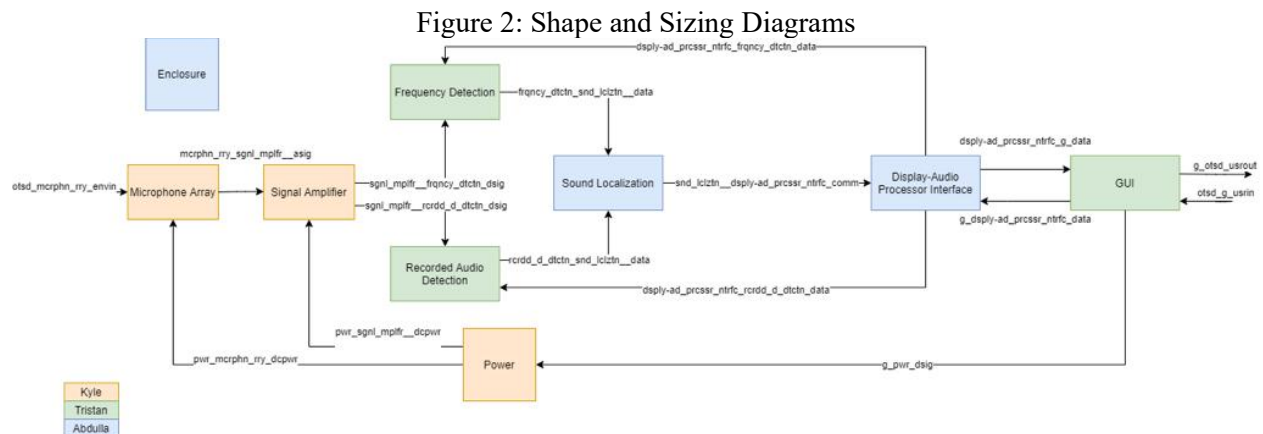Figure 2b: Back View with Microphones and camera slot

Figure 2: Shape and Sizing Diagrams

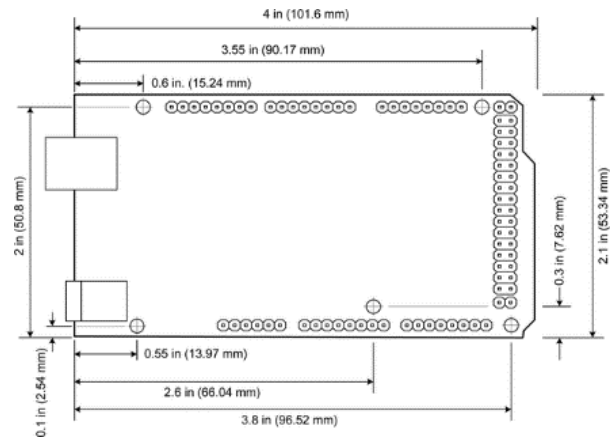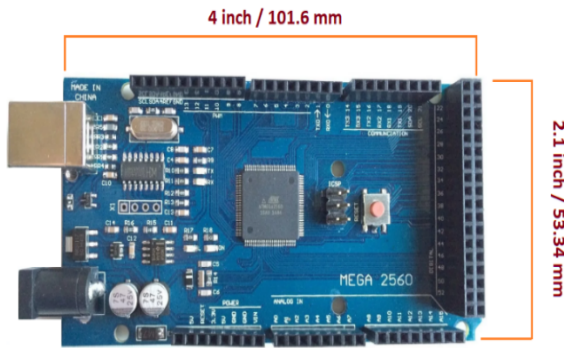Figure 3: Top Level Block Diagram of Complete Project

Figure 4a and 4b: Controller dimensions

Design Validation Overview

The main objective of this block is to provide a firm grip to android phone with a hollow cavity in enclosure fitting in the phone correctly. Furthermore, the controller size is 101.52mm x 53.3mm which is the main space taking equipment after the phone itself. The detailed dimensions of controller can be seen in figure 4a and 4b. The front of enclosure will have phone placement hollow cavity which can be adjusted as per size of the phone with a strap around the phone as shown in figure 2a.

A hole of 4mm diameter is placed on one corner in order to provide an opening for the camera. Furthermore, on the back of enclosure as shown in the Figure 2b, there are 4 microphone modules attached to the enclosure which will be done using m3 fasteners. The reason for choosing m3 fasteners is to provide a light weight but efficient grip to the enclosure thus protecting the inner vitals i-e phone and controller. Furthermore, there would be a hole of 3mm diameter below every microphone module from which the connecting wires of microphone would go inside the enclosure. Also, the controller inside the enclosure would be mounted using m3 fasteners at corners and a 0.5inch foam material would be placed below the controller to avoid damage of its soldering and pins. It can be seen in Figure 4a that there are 4 holes for m3 fastener mounting on the Arduino mega board which will be utilized here.

Design Validation Interface Table

Interface Property	Why is this interface this value?	Why do you know that your design details for this block above meet or exceed each property?
enclsr_pwr_mech : Output		
Fasteners: m3 * 2	Best suitable for light weight and good grip. See here	Enclosure needs to be light weight with best aesthetics so m3 fasteners will provide good grip with low weight and small drill holes.
Pulling Force: 300 N	A force of 300N if converted into mass is around 30kg. Calculation here	The value is selected by judgment call with maximum strength and durability design. With 300N it can afford a pulling force of 30kg weight with 9.8m/s^2 acceleration

Shear Force: 300 N	A sheer force of 300N is again selected by judgment call which can tolerate a compressive force of 30kg mass body downwards	Suitable for best durability and strength
Twisting Force: 300N	Like shear force. The reason is that the most probable cause is falling down or something falling on it which can damage in any angle.	The force from any angle whether pull, shear or twist will tolerate a 300N impact thus protecting the android phone and internal circuitry of system.

References

Force conversion : https://www.unitconverters.net/force/newtons-to-kg.htm#:~:text=It%20is%20defined%20as%20the,therefore%20equal%20to%209.80665%20N.

Fasteners : https://www.amazon.com/Stainless-Assortment-Precise-Beautiful-Printed/dp/B0714FLXND

Arduino Mega Dimensions: https://www.arduino.cc/en/Main/arduinoBoardMega2560/

Arduino Technical Details: https://www.oreilly.com/library/view/arduino-a-technical/9781491934319/ch04.html

Arduino sizing details: https://www.theengineeringprojects.com/2018/06/introduction-to-arduino-mega-2560.html