Memorandum

To: Dr.Oman
From: Team F5(Abdullah Ali, Mohammad Alkatan, Yousef Alkatan, Taha Alansari, Abdullah Abdulaziz)
Date: 11/17/2017
Re: Analytical Analysis II Memo

The memo shows the analyses that need to be done for the individual analysis assignment. An analysis of various components comprising the sensory board design will be carried out.

1. Trampoline spring

The elasticity of the trampoline spring will be analyzed. The trampoline spring is very crucial on a sensory board since it will facilitate adjustment depending on the preferences of the user. This is facilitated by the elastic nature of the trampoline spring. In order to determine the elasticity of the trampoline spring, Hooke's law will be applied whereby it is noted that it takes about twice as much force to stretch a spring twice as far.

2. The balance of the box

There is stuff which will be placed on the sensory board on both the inside and outside and hence balancing of the box is very crucial so as to ensure that the box remains balanced. In this regard, the force balance equation will be used to determine the appropriate position where various materials should be placed. In order to ensure that the sensory board is at equilibrium, various components and materials should be placed in such a manner that the net force acting upon the object should be zero Newton. Therefore, when all the forces acting on the board as vectors are added together, the resultant **force** should be 0 Newton.

3. Battery

The sensory board will be powered by lithium ion battery so as to make the instructional lights and a voice prompt functional. According to the engineering requirements the standby time for the battery should be six hours before it can be recharged again. One battery can provide an excellent service of up to six months before it expires and is replaced by another one. In one year, two batteries will be required and hence in a span of three years a maximum of six batteries will be required. In this manner the sensory board will have functioned at its best level and in an efficient manner.

4. Voltage

An analysis of voltage which was required in powering the electrical components in the sensory board was carried out. The major electrical components which required to be analyzed included the lighting and the sound system. The connection of the electrical components is in parallel and hence a total voltage will be determined using the formula for voltage in parallel connection. The voltage of the bulbs which will be used will then be analyzed using the derivative formula whereas the voltage for the sound device will be analyzed using the equation of the energy in sound that involves a voltage component. As the calculations are carried out, the resistance factors of the materials that will be used will be considered and hence the final voltage analysis will be based on the resistivity of the connecting wires.

5. Screws and Bolts

The sensory board will be mounted on the sitting device such as a wheel chair using screws to prevent it from falling. The diameter of the screws and bolts will be 1 inch to ensure that they do not pass through the slotted holes which are drilled. That diameter is also crucial since it will ensure that the bolt will fit a wide variety of slots in case of any adjustment which will be done. The bolt stiffness will be calculated using the joint stiffness formula which takes into account the tensile-stress area of the fastener; length of the threaded portion of the grip; diameter cross-sectional area of the fastener; length of the unthreaded portion in the grip, and the elastic modulus of the bolt material. After fastening the bolts, no protruding edges should be left to avoid inflicting injury to the user.