

To: Dr. David Trevas

From: Team 19F03- Hip Exoskeleton A

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Re: Hardware Review 1

The design of the hip exoskeleton device takes into consideration both the end user as well as the engineering requirements. A balance ought to be achieved between the user requirements and the engineering requirements. In overall emphasis is given to functionality of the device and its convenience. In line with that all parts are to bear properties and features that improves the working of the device. The assignment at hand according to plan was the construction of a thigh brace. The thigh brace grips the limb of the user and is connected to the control unit powered by a motor. In that case therefore the design considered a number of key design deliverables as highlighted below:

- Material selection
- Ergonomic and aesthetics
- Locus and functionality

For purposes of teamwork all the above were spearheaded by the various group members.

Material selection

The material of the component is very key and is defined along various lines. The material of the brace took into consideration two main factors which were; The weight of the brace and the nature of the material. Owing to the fact that the device is designed to assist humans with defects, the weight therefore is kept at its minimal. The assigned student taking care of the materials took that into consideration. The nature of the materials also ought to be non-threat to the user of the device. Elimination of carcinogenic materials or overly brittle materials such as Melamine is avoided for the health and safety of the user. Another factor considered in selection of the material was longevity and workability.

Ergonomic

This involved the design that appropriately accommodates the human's anatomy for proper interaction with the design component. In this case therefore consideration of the shape of the thigh was part of the key factors considered. The comfort ability and the manner of interaction is also a part of the considerations on ergonomic. A pad is fitted in the interior to avoid hurting by providing a uniform interface. By extension the aesthetics heavily relies on this as well. This defines the outlook of the component which in turn affects the overall look. Emphasis was then paid to the kind of coatings and finishes of the thigh brace.

Flexibility and locus

This defines the extent which the component extends during its execution. It defines the paths assumed by the moving parts ensuring no collisions and that the intended objective of ensuring motion is sustained. How the parts are joined was also important and the most effective way of reducing friction. This forms a core design element involving dimensioning of the parts and design of the screws for proper fitting in. The thigh brace fastens around the limb giving a grip. The fastening should be moderate and flexible taking care of the various sizes of legs making its use diverse.

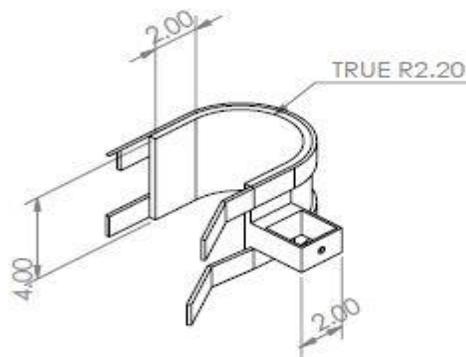


Figure 1 Schematic design for the thigh brace

Provision of interlocking segments as indicate above in **Figure1**.ensure both a firm grip as well as flexibility fitting onto users with varied sizes which is a key design deliverable. Dimensions are provided to the right precision too.

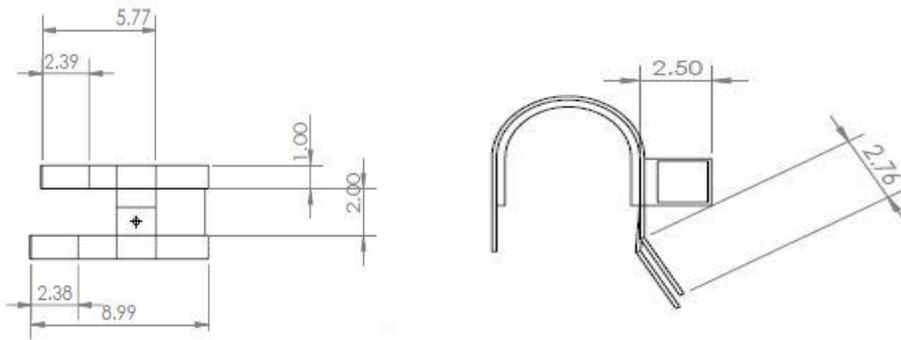


Figure 2 Other views of the thigh brace

COURSE OF ACTION

Following a Gantt chart that ensures proper allocation of time and performing of tasks simultaneously in the interest of delivering on time, the various parts are designed and made following a certain order. According to plan priority is given to the main parts of the hip exoskeleton device which are namely the thigh brace and the hip brace, The rest are parts joining this two main parts and next is a power source and its configuration to coordinate power the device for movement.

The hip brace design is therefore next meant to provide the housing where the human hip is held on the device. The design will follow similar principles as the functionality intended to be achieved more or less is similar to that of the thigh brace. Subsequent stages may see the adoption of a motor designed to produce enough power to mobilize the device. Other tasks include inclusion of the joining parts links and joints.

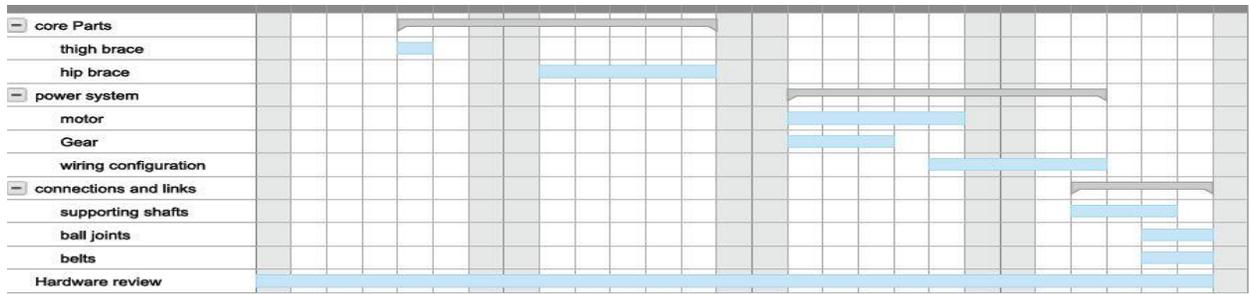


Figure 3 Gantt chart tasks schedule

Appendix:



