

Project created on 08.09.2016 13:53.

Report for project Senior Design Electronic book

Task created on 21.04.2017 13:39.

Final Conclusions

No due date

No description

Task tags: *No tags*

Completed by Shirshak Aryal on 21.04.2017 13:42.

➔ Step 4: 8.7 What future steps would we take?

In order to ensure the proper functioning of the device in practical setting, we have to test the device with actual burn patients for extended period of time and collect feedback. In order to ensure that all the design criteria has been fulfilled and the intended physical rehabilitation is achieved, we have to carry out survey among multiple patients and track their rehabilitation progress. A key element to the success of this device is patient compliance. So once this device is given out to the patients, we need to collect constant feedback from them to see if they are wearing the device for the required number of hours a day.

Completed by Shirshak Aryal on 21.04.2017 13:41.

➔ Step 3: 8.5 Are there any ethical considerations?

The primary motive of this Hand Burn Rehabilitation Device was to bridge the gap between the burn patients and their lack of financial resources for proper physical therapy. This device was intended to be a cheaper substitute of physical therapy for the poor rural population. Hence, it is absolutely crucial that the device be within reasonable affordability margin for the rural population.

Completed by Shirshak Aryal on 21.04.2017 13:41.

➔ Step 2: 8.3 What did we learn?

The main lesson that we learned through this project was the concept of product design and all the different steps involved in the process. We learned about how to go on about identifying a problem, and carrying out the necessary research to come up with a viable solution. We also learned a great deal about coming up with independent design feature ideas and building prototypes to test them. In addition to the design process, we also learned a lot about burn wounds, and

various level of tissue structure that are affected by it. We also learned about current medical technologies that are being used to treat these burn patients. On an individual level this was a very intensive bioengineering design experience, working as a part of a team with other engineers and physicians, in a laboratory setting under real budget and time constraints. And part of this learning experience involved running into many roadblocks and pitfalls associated with the design process. We initially set out to creating a perfect solution, however soon realized that we had to digress from many of the ideas that we had, and figure out other alternatives as we went along. The optimal design did not include the perfect solution but also took into account the affordability, availability, patient comfort and many other criteria where we had to compromise to come up with a balanced solution.

Completed by Shirshak Aryal on 21.04.2017 13:40.

➔ **Step 1:** 8.1 Did we solve the problem?

The problem that our device was designed to deal with was the physical rehabilitation of post-surgery scar tissue contracture. Our device has three key features in order to achieve this goal. By employing the static progressive splint mechanism in the exoskeleton, the splint is able to provide gradual extending force on the scar tissue depending upon the various stages of recovery and facilitate the mechanical rehabilitation process. The second feature includes an elastic glove made up of spandex that provides compressive forces to the fingers and the palm that helps with straightening of the scar tissue mesh. The third feature includes a hypafix layer inside the glove which helps reduce the formation of hypertrophic scars. By integrating these three key design features into our product will solve the problem of physical rehabilitation for post-surgery scar tissue contracture for burn patients. However, the device testing would have to be done over a period of 6-12 months for conclusive feedback from the patients, in order to judge its success in practice.

🗄️ Activity of task Final Conclusions

21.04.2017 13:39 *Shirshak Aryal* created task **Final Conclusions**.

21.04.2017 13:40 *Shirshak Aryal* created Step 1 **8.1 Did we solve the problem?**

21.04.2017 13:40 *Shirshak Aryal* completed Step 1 **8.1 Did we solve the problem?** (1/1 completed).

21.04.2017 13:40 *Shirshak Aryal* created Step 2 **8.3 What did we learn?**

21.04.2017 13:41 *Shirshak Aryal* completed Step 2 **8.3 What did we learn?** (2/2 completed).

21.04.2017 13:41 *Shirshak Aryal* created Step 3 **8.5 Are there any ethical considerations?**

21.04.2017 13:41 *Shirshak Aryal* completed Step 3 **8.5 Are there any ethical considerations?** (3/3 completed).

21.04.2017 13:42 *Shirshak Aryal* created Step 4 **8.7 What future steps would we take?**

21.04.2017 13:42 *Shirshak Aryal* completed Step 4 **8.7 What future steps**

would we take? (4/4 completed).

Task created on 21.04.2017 13:33.

Parts List

No due date


No description

Task tags: *No tags*

Completed by Shirshak Aryal on 21.04.2017 13:36.

Step 1: List of parts with useful information

No description

 [*Screen_Shot_2017-04-21_at_8.33.02_AM.png*]

File uploaded on 21.04.2017 13:36.

Activity of task Parts List

21.04.2017 13:33 *Shirshak Aryal* created task **Part List**.

21.04.2017 13:36 *Shirshak Aryal* created Step 1 **List of parts with useful information** .

21.04.2017 13:36 *Shirshak Aryal* completed Step 1 **List of parts with useful information** (1/1 completed).

Samples of task Parts List

No samples

Task created on 21.04.2017 13:30.

Webpage Update

No due date

No description

Task tags: *No tags*

Completed by Shirshak Aryal on 21.04.2017 13:31.

Step 1: Webpage is up to date!

Website was updated on 18th April 2017. Documents & information pertaining to project progress was updated. All the weekly report and journals since the beginning of the project is available in this new iteration of the website. Copy of powerpoint presentations from preliminary, progress and validation & verification presentation was also uploaded. Information about project timeline, problem, project scope, design specs, personal & contact information were previously updated. Prior to the final presentation, images and videos showing different test results will also be uploaded in the next iteration of the website. After our final

presentation, visual proof of working prototype and powerpoint presentation of final presentation will be updated on the website.

Activity of task Webpage Update

21.04.2017 13:30 *Shirshak Aryal* created task **Webpage Update**.

21.04.2017 13:31 *Shirshak Aryal* created Step 1 **Webpage is up to date!**.

21.04.2017 13:31 *Shirshak Aryal* completed Step 1 **Webpage is up to date!** (1/1 completed).

Samples of task Webpage Update

No samples

Task created on 21.04.2017 13:24.

Design Safe Analysis

No due date


No description

Task tags: *No tags*

Completed by Shirshak Aryal on 21.04.2017 13:29.

Step 2: Design Safe Analysis after risk mitigation

No description


 [*Screen_Shot_2017-04-21_at_8.28.55_AM.png*]

File uploaded on 21.04.2017 13:29.

Completed by Shirshak Aryal on 21.04.2017 13:28.

Step 1: Desin Safe Analysis before any mitigation steps

No description

 [*Screen_Shot_2017-04-21_at_8.26.07_AM.png*]

File uploaded on 21.04.2017 13:28.

Activity of task Design Safe Analysis

21.04.2017 13:24 *Shirshak Aryal* created task **Design Safe Analysis**.

21.04.2017 13:25 *Shirshak Aryal* created Step 1 **Desin Safe Analysis before any mitigation steps**.

21.04.2017 13:25 *Shirshak Aryal* completed Step 1 **Desin Safe Analysis before any mitigation steps** (1/1 completed).

21.04.2017 13:27 *Shirshak Aryal* uncompleted Step 1 **Desin Safe Analysis**

before any mitigation steps (0/1 completed).

21.04.2017 13:27 *Shirshak Aryal* deleted Step 1 **Desin Safe Analysis before any mitigation steps**.

21.04.2017 13:28 *Shirshak Aryal* created Step 1 **Desin Safe Analysis before any mitigation steps**.

21.04.2017 13:28 *Shirshak Aryal* completed Step 1 **Desin Safe Analysis before any mitigation steps** (1/1 completed).

21.04.2017 13:29 *Shirshak Aryal* created Step 2 **Design Safe Analysis after risk mitigation**.

21.04.2017 13:29 *Shirshak Aryal* completed Step 2 **Design Safe Analysis after risk mitigation** (2/2 completed).

Task created on 21.04.2017 12:49.

Mechanical Drawing for Parts

No due date


No description

Task tags: *No tags*

Completed by Shirshak Aryal on 21.04.2017 13:21.

Step 5: Compressive Glove

No description

 [*Screen_Shot_2017-04-21_at_8.17.11_AM.png*]

File uploaded on 21.04.2017 13:21.

Completed by Shirshak Aryal on 21.04.2017 13:14.

Step 4: Hypafix

No description

 [*hypafix.png*] File uploaded on 21.04.2017 13:14.

Completed by Shirshak Aryal on 21.04.2017 13:13.

Step 3: Exoskeleton base part

No description

 [*Plane3.png*] File uploaded on 21.04.2017 13:13.

Completed by Shirshak Aryal on 21.04.2017 13:13.

🔗 Step 2: Exoskeleton: 2nd Part

No description

 [Plane2.png] File uploaded on 21.04.2017 13:12.



Completed by Shirshak Aryal on 21.04.2017 13:08.

🔗 Step 1: Exoskeleton 1st part

No description

 [Plane1.png] File uploaded on 21.04.2017 13:08.



📊 Activity of task Mechanical Drawing for Parts

21.04.2017 12:49 *Shirshak Aryal* created task **Mechanical Drawing for Parts.**
 21.04.2017 13:08 *Shirshak Aryal* created Step 1 **Exoskeleton 1st part.**
 21.04.2017 13:08 *Shirshak Aryal* completed Step 1 **Exoskeleton 1st part** (1/1 completed).
 21.04.2017 13:12 *Shirshak Aryal* created Step 2 **Exoskeleton: 2nd Part.**
 21.04.2017 13:13 *Shirshak Aryal* completed Step 2 **Exoskeleton: 2nd Part** (2/2 completed).
 21.04.2017 13:13 *Shirshak Aryal* created Step 3 **Exoskeleton base part.**
 21.04.2017 13:13 *Shirshak Aryal* completed Step 3 **Exoskeleton base part** (3/3 completed).
 21.04.2017 13:14 *Shirshak Aryal* created Step 4 **Hypafix.**
 21.04.2017 13:14 *Shirshak Aryal* completed Step 4 **Hypafix** (4/4 completed).
 21.04.2017 13:21 *Shirshak Aryal* created Step 5 **Compressive Glove.**
 21.04.2017 13:21 *Shirshak Aryal* completed Step 5 **Compressive Glove** (5/5 completed).

💧 Samples of task Mechanical Drawing for Parts

No samples

Task created on 16.04.2017 14:33.

📄 Compression Gloves Prototyped

No due date

No description

Task tags: *No tags*

Completed by Shirshak Aryal on 16.04.2017 15:00.

🔗 Step 3: Hypafix lining utility


Glove was tried with different amount of hypafix and placing them on different

areas of hand. Firstly, hyafix was only lined on the palm area and gloves were put on. Secondly, hyafix was also lined on all the fingers and gloves was put on. Our test patient felt that second iteration of hypafix use provided better soothing effect. Additonally, by applying hyafix on the finger, test patient felt enhanced feeling of compression. Thus, increases compressing capability of gloves, which is a useful feature for this aspect of design.


Completed by Shirshak Aryal on 16.04.2017 14:53.

➔ Step 2: Pictures and further details.

Shirshak volunteered to be test patient for testing the ease of use and compression aspect of the glove. Firstly, hypafix was used to cover carpels (palm) of the hand. Likewise, each of the fingers were also taped with hypafix. Then, the glove was worn, housing the hypafix lining.


 [*Hypafix_lining_back_(location_tentative).jpg*]


File uploaded on 16.04.2017 14:53.


 [*Hypafix_lining_front_(locationtentative).jpg*]

File uploaded on 16.04.2017 14:53.

 [*Compression_Glove.jpg*] File uploaded on 16.04.2017 14:53.

 [*Compression_Glove_back_view.jpg*] File uploaded on 16.04.2017 14:53.

 [*Compression_Glove_back_view2.jpg*] File uploaded on 16.04.2017 14:53.

 [*Compression_glove_made_of_spandex_(unstretched)...*]

File uploaded on 16.04.2017 14:53.

 Comments for step Pictures and further details.

No comments

Completed by Shirshak Aryal on 16.04.2017 14:41.

➔ Step 1: Gloves Final Prototype

We were able to sew the compression gloves yesterday in the techshop. Out of different glove design which we had shortlisted as feasible for our purpose, we agreed that "Open Fingers" also known as "Open Tip" gloves would be the best according to our design specs. This gloves provides needed compression, which was one of the major need our of design specification. Open tip on each fingers improves the breathability aspect of the glove while still providing adequate compression.

Activity of task Compression Gloves Prototyped

16.04.2017 14:33 *Shirshak Aryal* created task **Compression Gloves Prototyped** .

16.04.2017 14:34 *Shirshak Aryal* created Step 1 **Gloves Final Version** .

16.04.2017 14:41 *Shirshak Aryal* edited Step 1 **Gloves Final Prototype**.

16.04.2017 14:41 *Shirshak Aryal* completed Step 1 **Gloves Final Prototype** (1/1 completed).

16.04.2017 14:44 *Shirshak Aryal* created Step 2 **Pictures and further details..**

16.04.2017 14:50 *Shirshak Aryal* edited Step 2 **Pictures and further details..**

16.04.2017 14:53 *Shirshak Aryal* edited Step 2 **Pictures and further details..**

16.04.2017 14:53 *Shirshak Aryal* completed Step 2 **Pictures and further details.** (2/2 completed).

16.04.2017 15:00 *Shirshak Aryal* created Step 3 **Hypafix lining utility**.

16.04.2017 15:00 *Shirshak Aryal* completed Step 3 **Hypafix lining utility** (3/3 completed).

Samples of task Compression Gloves Prototyped

No samples