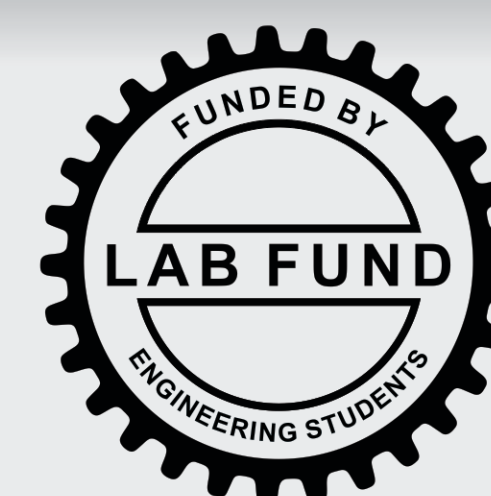


Dynamic Scapular Winging Brace

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Background

- Scapular winging restricts shoulder range of motion and prevents individuals from performing activities of daily living (Fig. 1)^[1]
- Bracing is a conservative treatment method which prevents winging by holding the scapula stationary against the ribcage^[1]
- By keeping the scapula stationary, existing braces restrict shoulder movement and the ability to perform activities of daily living

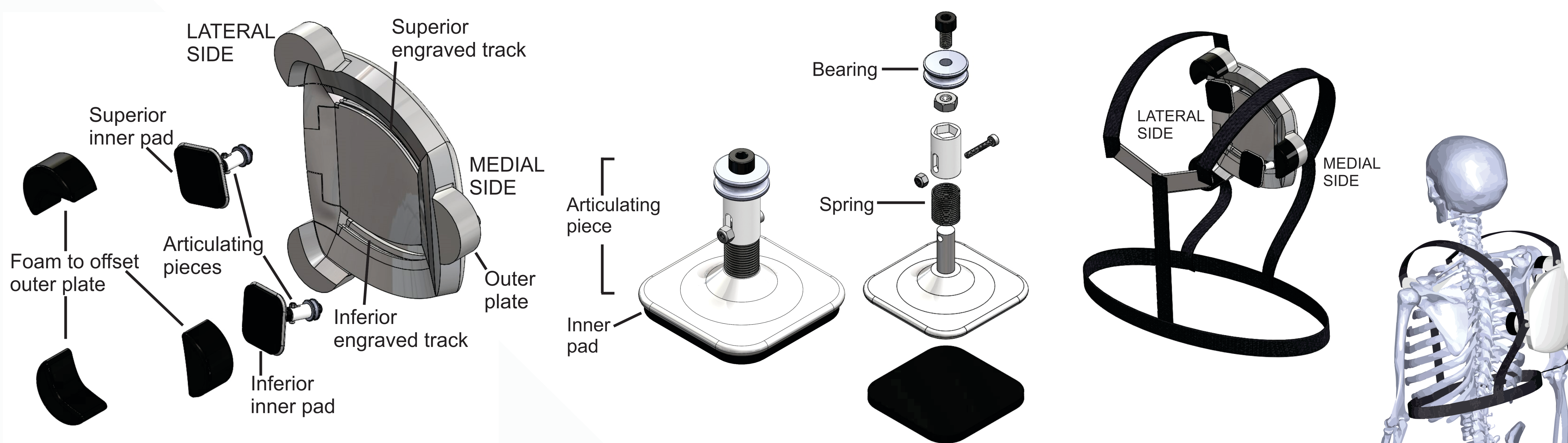


Fig. 1: Scapular winging

Objective

- Design a custom brace that supports the scapula throughout shoulder flexion and allows for greater shoulder range of motion than that of existing braces
- The brace must allow a healthy user to perform shoulder flexion and activities of daily living

Proposed Design



- Inner pads sit on medial border of scapula and articulate with engraved tracks in outer plate which is offset from the back
- Spring and bearing in articulating piece allow for scapular rotation and translation throughout shoulder flexion
- Engraved tracks are modelled from the user's scapular kinematics for shoulder flexion (Fig. 2)
- Inner pad-outer plate system provides force to scapula while the engraved tracks enforce correct scapular motion throughout shoulder flexion
- Straps across the chest and along the sternum secure the brace to the user

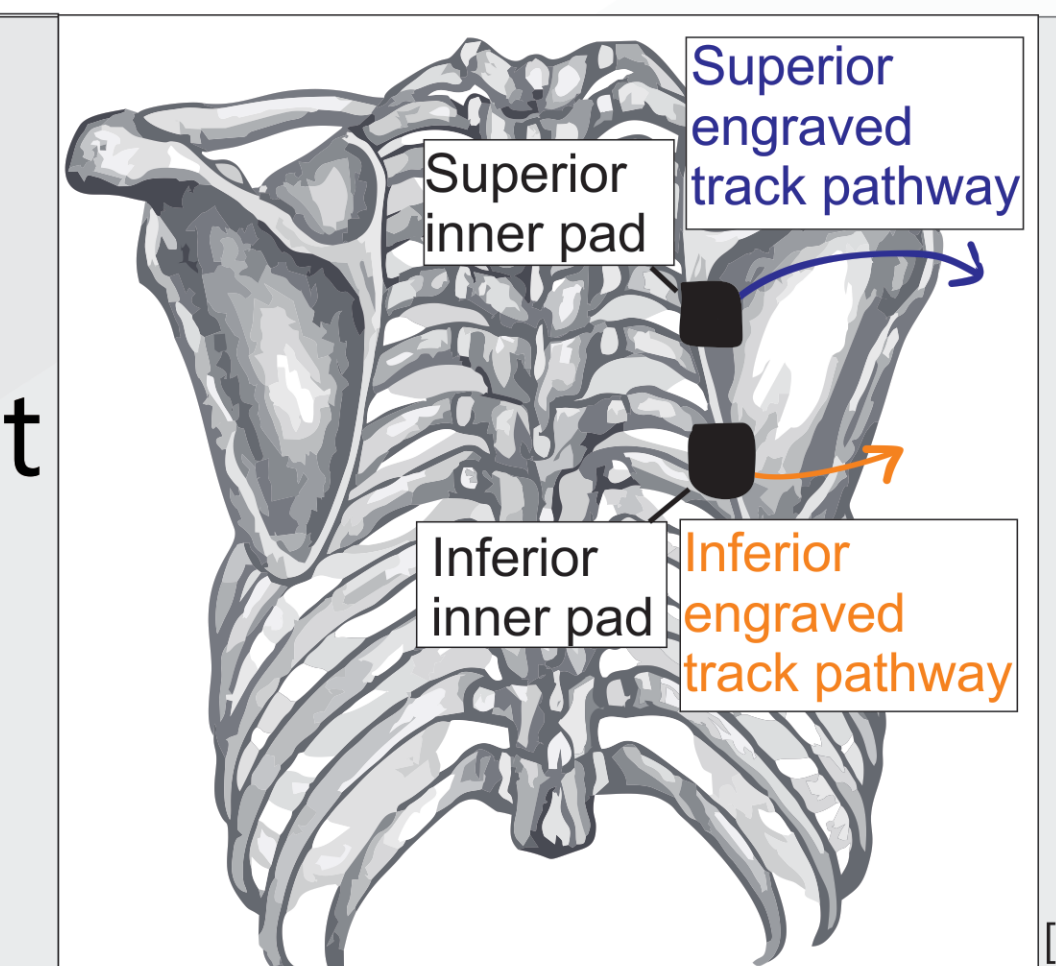


Fig. 2: Movement pathway of inner pads articulating with the outer plate from anatomical position to full shoulder flexion

Conclusion and Future Work

- Brace is comfortable and does not restrict shoulder flexion in sagittal plane
- Healthy individual is able to perform activities of daily living while wearing the brace
- Future work: determine the appropriate amount of force to apply to the medial border
- Incorporate more engraved tracks to allow for arm abduction

References

- [1] M. Vastamaki, V. Pikkarainen, H. Vastamaki and L. Ristolainen, "Scapular Bracing is Effective in Some Patients but Symptoms Persist in Many Despite Bracing," *Clinical Orthopaedics and Related Research*
- [2] D. P. Franz, C. P. Schonhuth, T. J. Postma, B. J. van Royen, "Parsonage-Turner Syndrome Following Post-Exposure Prophylaxis," *BioMed Central Musculoskeletal Disorders*
- [3] Figure adapted from J. Fitzgordon, "The Shoulder Girdle," Retrieved from <http://corewalking.com>