

Variable Tension Orthotic Device for Children with Spastic Cerebral Palsy

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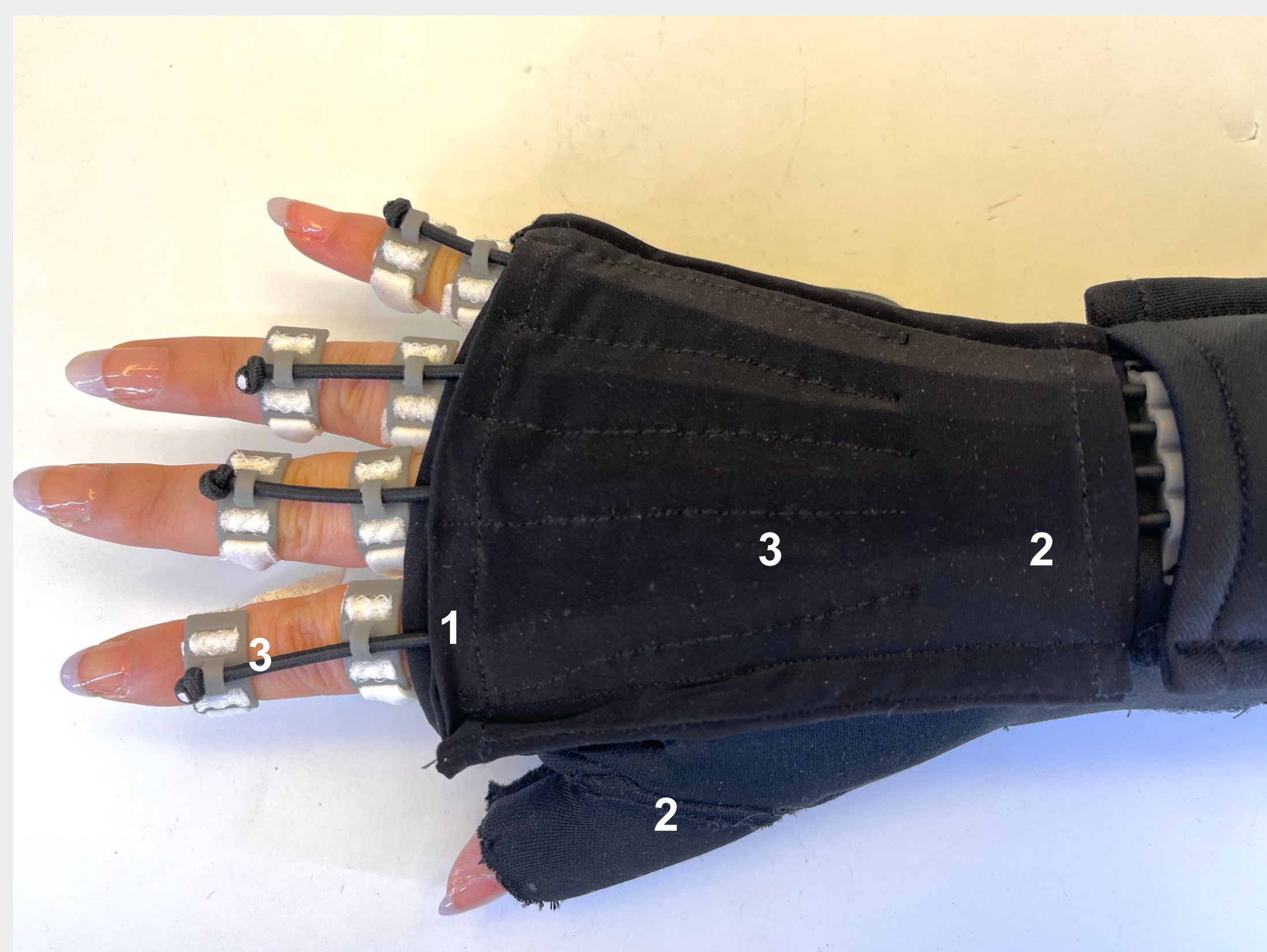
Problem

- Spastic cerebral palsy (CP) affects every 2 out of 1,000 births in the US¹
 - Causes stiff muscles and weakened fine motor control
- Current orthotics are bulky, uncomfortable, and must be replaced regularly as children grow

Gap: An affordable, sleek, and comfortable orthotic that strengthens the hand and wrist muscles

Proposed Solution

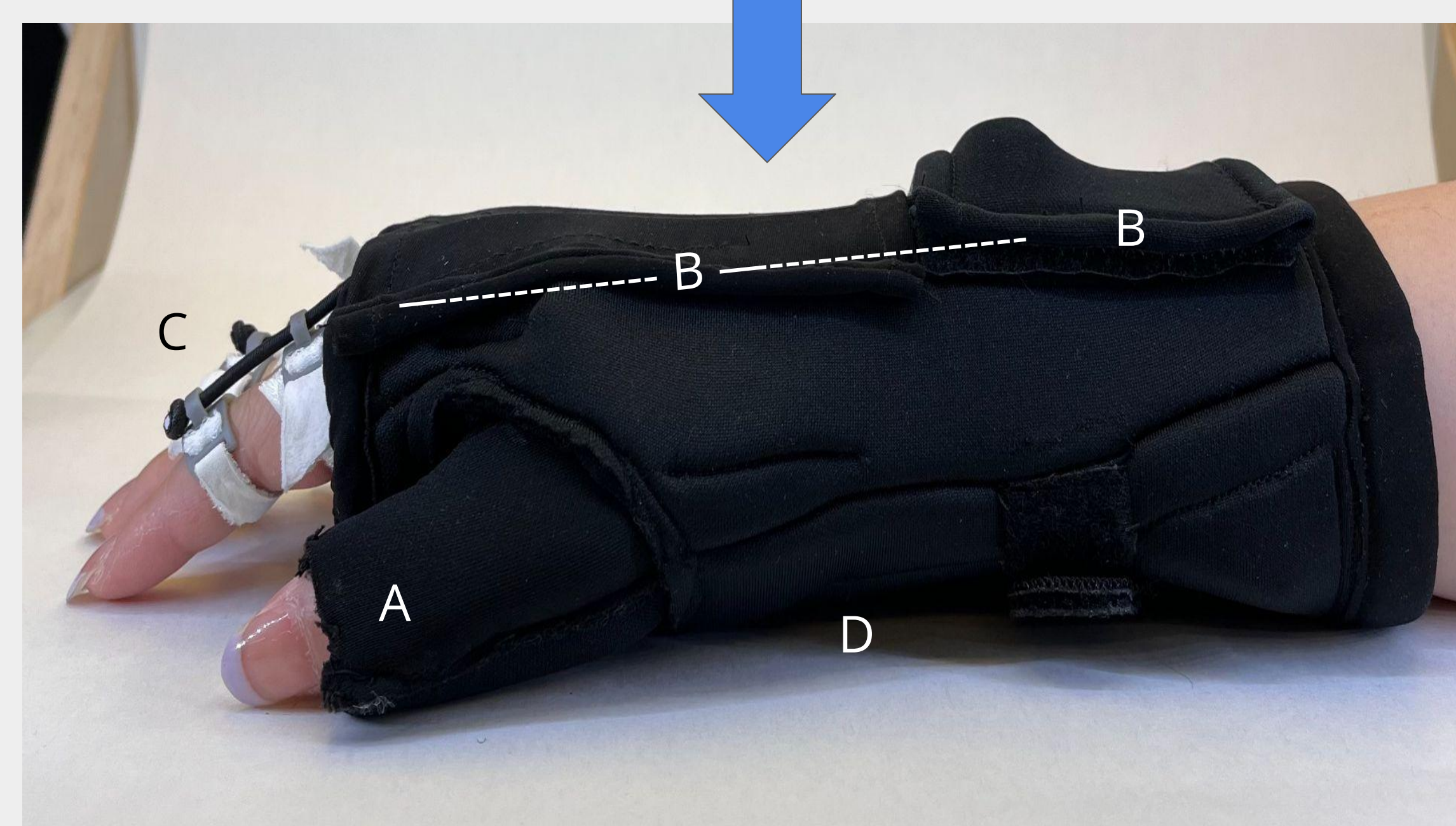
Our solution is an orthotic device that integrates bracing and occupational therapy to offer improved efficacy and longer-term treatment at a reduced cost for patients aged 5-10 with spastic CP.



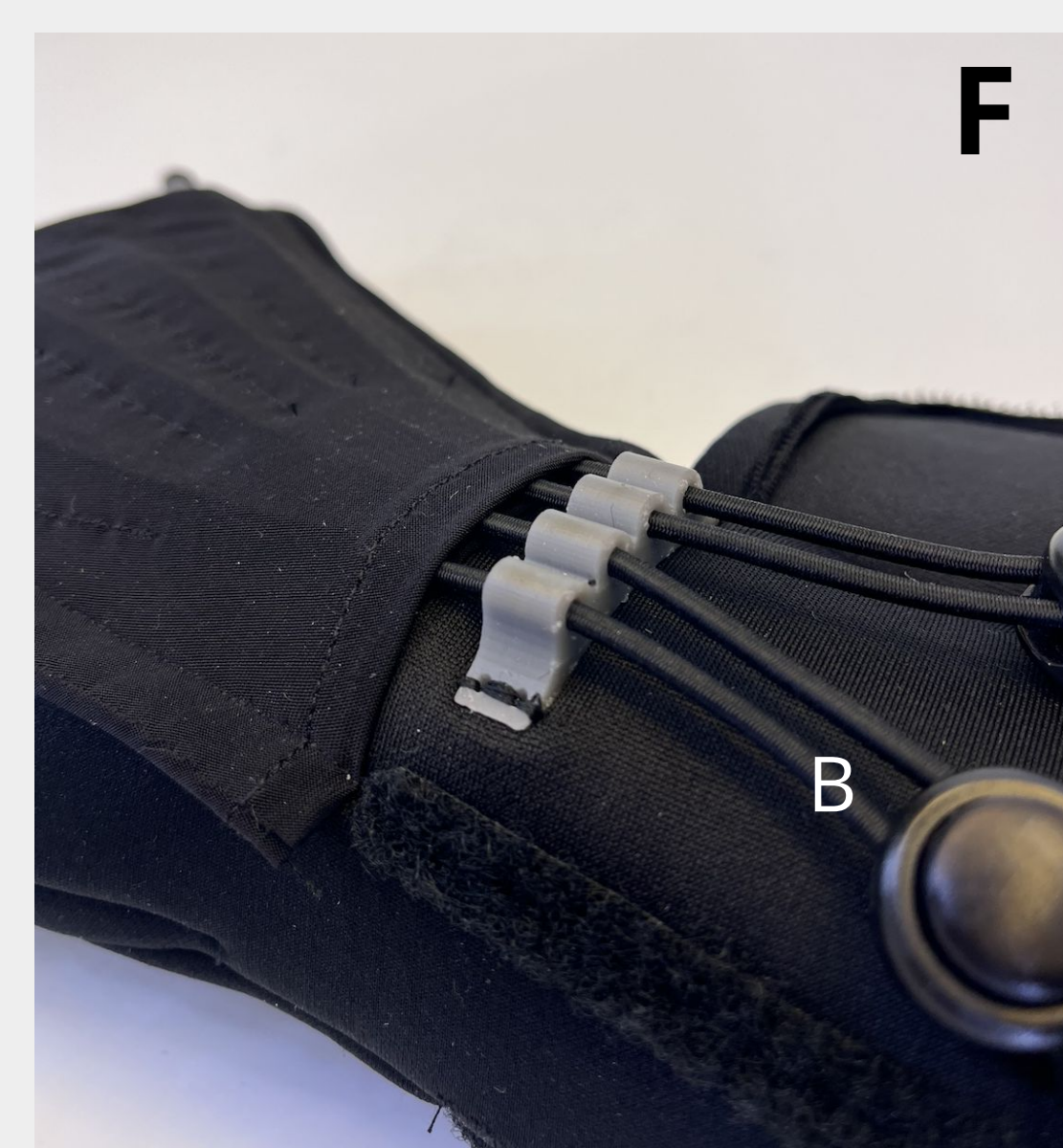
Key features:

- Network of adjustable tension cables** to promote finger extension
- Bracing in wrist and thumb** to promote optimal positioning for function
- Soft, moisture-wicking materials** to ensure comfort
- Designed for all day wear** to promote the completion of daily functional living tasks and therapeutic exercises

Final Design



Tension cables provide resistance to muscle contraction, promote finger extension



E&H: Thumb (A) and wrist (D) braces position the joints out of the flexed position.

F&G: Tunable tension cables (B) connected to comfortable finger bands (C) promote finger extension and muscle relaxation

Reimbursement

- Orthotic devices like ours are covered by Medicaid in all states
- Because our device is not designed for patients aged 65 and older, it is not covered by Medicare
- Quantity and/or frequency limitations that are common for prosthetic and orthotic devices are anticipated

Cost

Soft Goods Production	\$5.31
Injection Molding Production	\$4.50
Injection Molding Tooling	\$5.58
Ready-Made Components	\$5.42
Final Assembly & QA	\$11.30
Total (per unit before volume discounts)	\$32.11

Patent

No device similar to ours currently has a patent. Due to this, it is believed that our device will be patentable.

Sources

- "Data and Statistics for Cerebral Palsy." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 31 Dec. 2020, <https://www.cdc.gov/ncbddd/cp/data.html>
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- Stavsky, M., Mor, O., Mastroli, S. A., Greenbaum, S., Than, N. G., & Erez, O. (2017). Cerebral Palsy-Trends in Epidemiology and Recent Development in Prenatal Mechanisms of Disease, Treatment, and Prevention. *Frontiers in pediatrics*, 5, 21. <https://doi.org/10.3389/fped.2017.00021>

Acknowledgements

The team would like to thank Alefia Kothambawala, Dr. Conrad Zapanta, CMU URO, and Wendy Kostner for their support.

BME Design Poster Grading Spring 2021

Criteria	Ratings	Pts
<p>Problem</p> <ul style="list-style-type: none">• What problem are you trying to solve?• What is the status quo?• What is the gap?		15 pts
<p>Proposed Solution</p> <p>Clearly demonstrate operation of proposed solution</p>		10 pts
<p>Proof that Solution Worked</p> <p>Provide evidence that solution worked</p>		20 pts
<p>Other Things that People May care About</p> <ul style="list-style-type: none">• Reimbursement• Patent• Costs		15 pts
<p>Communicate with General Audience</p> <p>Use terms that lay audience can understand</p>		10 pts
<p>Visual Presentation</p> <ul style="list-style-type: none">• Title and main headings are clearly readable from 4 to 6 feet away• Photographs, drawings, charts, etc. are clear and enhance the project• Jargon is avoided or explained clearly; spelling and grammar is correct		15 pts
<p>Basic Information</p> <ul style="list-style-type: none">• Title is clear and concise• Poster includes all names, collaborators, advisors, and sponsors (if applicable)• Acknowledgements are clear (funding resources, departments, etc.)		15 pts
		Total Points: 100