

# Embracing Scoliosis

BMEN 3151 Medical Device Practicum

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## Clinical Problem

Scoliosis is a S or C-shaped curvature of the spine. Diagnosis usually occurs in adolescents around the time of puberty. Scoliosis can be prominent in conditions such as muscular dystrophy, but the underlying cause of scoliosis is unknown. Scoliosis ranges from mild curvatures to extreme curvatures. Severe scoliosis can be debilitating; it reduces lung capacity and makes it difficult to breathe, which can lead to heart problems. In cases of severe scoliosis, surgery is a viable option. For less severe cases, bracing is a treatment option. Current scoliosis braces are very restrictive and not ideal in today's society. There is a lack of suitable ways to stabilize the spine/correct spinal alignment for patients with scoliosis. We are aiming to create a back brace that is more ideal for daily life activities for patients with scoliosis.



## Needs Statement

An improved back support for patients with scoliosis that is more suitable for daily life activities.

## Market Analysis

Our new back brace solution targets patients with scoliosis. More specifically, younger patients that find the current brace design restrictive of their daily life activities. There are 3 million new cases of scoliosis diagnosed each year in the United States alone. The current market for scoliosis braces is very limited. Rigid polyethylene plastic braces are the most common treatment for scoliosis besides more invasive treatments such as surgery, tethering, and expanding rods. These braces can cost up to \$2600-\$3000 per brace and an individual patient could require multiple braces based on their growth pattern. Studies have shown that 27%-69% of scoliosis patients receiving treatment with the rigid polyethylene plastic braces showed poor brace compliance for reasons including, lack of comfort, mobility, and social stigmas surrounding back braces.

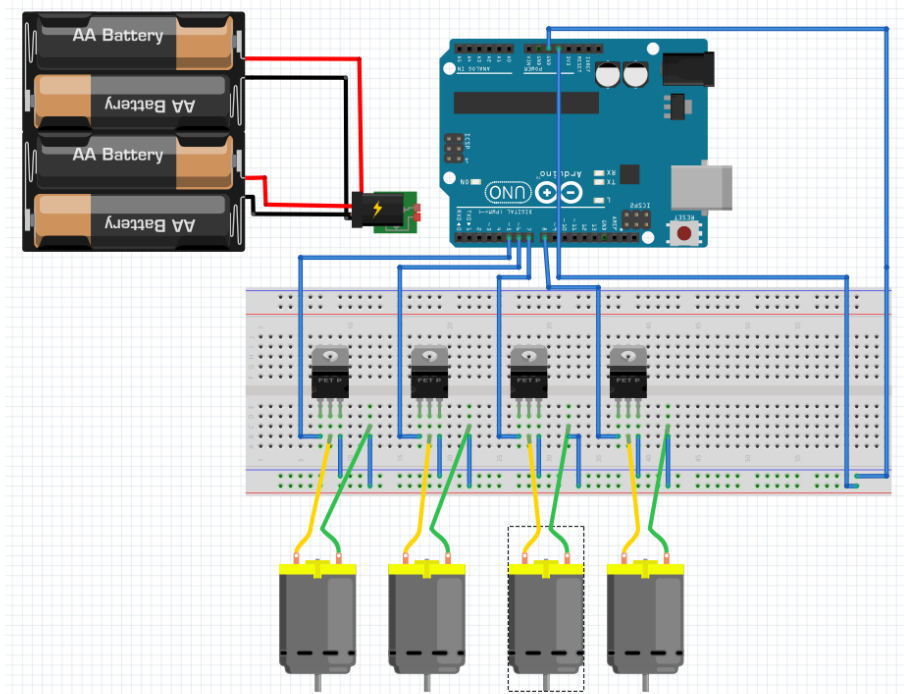
## Medical Device Solution

Inflatable vest customizable to the degree of the patient's spinal curves. Ribbing was hot glued into the inside of the fabric in order to give structural stability for the brace. The fabric was sewed onto itself to create a pouch where the balloons can be slid in. The balloons were

connected to the air pumps via .75" tubing. The air pumps were powered by the Arduino power and mosfets because they require high current. We wrote an Arduino code



that takes in the length of the spine as well as the width of the back. The code then calculates the angle of back curvature and inflates the balloons accordingly. This will give the patient relief and fix their scoliosis over time.



## Team Photo

