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The Mechanical Design of Pnuematic Actuated Balance Board

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People who suffer from lower back pain are restricted from simple, everyday movements. The treatment that individuals with back disabilities endure can be painful and limit their movements which prolongs a doctor's medical prognosis. Individuals with back pain adapt their lives around their experience of pain and can be a difficult way to live. By using a pneumatic actuated balance board the Mechatronics Club will gain awareness and build a sufficient process to treat patients who experience lower back pain while performing dynamic tasks while sitting.

The project uses the novel pneumatic balance board and combines it with seated individuals to test for the response of the Lumbopelvic musculature. This method gives key insight to how individuals adapt their back pain to the environment of their daily lives. Firstly, the aim of the study is to adapt a previously developed balance board which only applies to standing patients. Next, the board will be validated against a gold-standard laser measurement system. Finally, the Mechatronics Club will perform a small case study which will provide data so it can be used to make improvements for the project. Overall, the project will assist individuals that experience chronic lower back pain to do activities sitting down.

This project is developed a pneumatically driven balance board to be used in the evaluation of dynamic postural control. The development of a balance board that can deliver external perturbations will be significant in the evaluation and treatment of motor control deficits in individuals with chronic low back pain (cLBP). Unlike commercially available passive balance boards, our pneumatic balance board will be a movable platform driven by pneumatic artificial muscles (PAMs) with 3 axes; the "elevation" movement that will allow the platform to rotate around the z-axis (move in the vertical direction), the "roll" movement that will rotate it

around the x-axis, and finally the "pitch" movement that allows it to rotate around the y-axis. In addition, the spherical joints used to move the pneumatic muscles relative to the upper platform will increase the mobility of the platform.