# Levitating Magnetic Insoles: A Novel Approach to Alleviating Plantar Fasciitis Through the Reduction and Redistribution of Plantar Pressures

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According to American Podiatric Medical Association, four out of five Americans experience foot pain. Inflammation, mostly common caused by daily overuse, leads to the majority of foot pain. The magnetic levitation device that adjusts the distribution of plantar pressure can relieve plantar foot pain effectively. The device consists of a cheap, soft, light sole that uses levitation force from neodymium magnets for a better and more even spread of body weight. The magnetic repulsion force in the final prototype is approximately 84.57lbs. It incorporates a pressure sensor module and accelerometer to detect plantar pressure and acceleration of every motion. The project also fulfills the real-time data transmission and visualization between Arduino and personal devices, which produces valuable data to analyze plantar pressure and walking characteristics of different patience. Using MATLAB and Excel, heatmaps that summaries the plantar pressure distribution can be formed, allowing further analysis and structural optimization. To expand, it would also be valuable to strengthen the intensity of the magnets to promote the effectiveness of pain relief and to add disease personalization element to specify the location of each magnet in the sole.

**Awards Won:**