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Design and Implementation of GPS-Enabled Smart Shoes Powered by Piezoelectric Energy Harvesting

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Abstract: *This research introduces a GPS-enabled smart shoe powered by piezoelectric energy harvesting. Flexible piezoelectric discs beneath the insole convert walking-induced mechanical stress into electrical energy, which is stored and used to power an on-board GPS module. The goal is to develop an energy-autonomous wearable for tracking and safety. The smart shoe integrates piezoelectric materials in the sole to generate electricity from motion, enabling real-time GPS tracking without frequent charging. This eco-friendly system supports personal safety, fitness tracking, and navigation, particularly benefiting athletes, adventurers, and the elderly. Designed for low power consumption, it extends the GPS module's lifespan using harvested energy.*

Keywords: Piezoelectric, Energy harvesting, GPS, Smart shoe, Energy autonomous

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