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Smart Blind Stick

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Abstract: *About 2.2 billion folks across the planet deal with vision impairment, making movement and routine tasks tough. White canes help plenty, yet miss dangers like overhead items, things at chest height, or slick surfaces underfoot. Instead of sticking strictly to tradition, our team explored something smarter using an ESP32 chip as its brain. It uses two HC-SR04 sensors working together - spotting blocks high and low by sending out sound pulses. Moisture detection comes through a touch-based pad that reacts when water changes surface charge nearby. Location tracking? That part runs on a Neo-6M GPS piece, quietly updating position without delay. When tested in real hands, distance readings stayed accurate within plus or minus two centimeters. Cold start included - the GPS found satellites every time, never taking longer than 45 seconds to connect. Power draw got close attention - this whole system works just fine on a regular 3.7V lithium battery holding 3000mAh, lasting about seven and a half hours nonstop before needing more juice. Not stuck inside a lab, we worked alongside community groups supporting people with disabilities, launching hands-on trials across urban areas to watch how it holds up during actual travel routines. Sitting right in the middle - not too simple, not overloaded with tech - it becomes a wallet-friendly tool that boosts sureness for those who are blind or have limited sight when walking new routes*

Keywords: Arduino Assistive Technology, ESP32, Ultrasonic Sensors, GPS Tracking, Emergency Alert System, Smart Mobility, Hazard Detection

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