SMART Cane: A Technology Integrated Device to Reduce the Fall Susceptibility of the Elderly

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“SMART Cane” innovatively employs technology to reduce the fall susceptibility of the elderly. By focusing on minimizing the key aspects contributing to fall susceptibility, this project intends to improve the independence of living for the 200 million elderly people who fall each year. The key components of the cane were developed using an Arduino microcontroller. The cane has an ultrasonic sensor based elevation monitor, which alerts users of approaching increases or decreases in elevation, such as curbs, and objects. Additionally, a second ultrasonic sensor is included to reduce false alerts in instances of approaching walls and other obvious objects, in an effort to account for realistic user-device interactions. The second component uses reflected light to determine a user’s pulse rate, alerting them if their pulse reaches unsafe levels, which can result in dizziness or fainting. Vibration motors in the handle run, in different patterns, for changes in both elevation and pulse. Vibration was chosen as the alert method because it is unobtrusive and tactile, appealing to sight and hearing impaired users. Finally, a light is included on the cane, triggered by a force sensor, to help users maneuver at night. The prototype, when introduced to a group of elderly, received overwhelming positive feedback. In addition to reducing fall susceptibility and improving independence, the project also has applications in nursing homes as a time and cost saver. Utilizing technology, this project hopes to innovatively address the leading cause of fatal and nonfatal injuries in the elderly, thus improving millions of lives.