2024 Foothill Case Competition Round Two Submission

TITLE: Senior Ally

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EXECUTIVE SUMMARY:

By 2050, 22% of the world's population will be over the age of 60, with 80% in low to middle income countries (WHO). 88% of adults aged 50 to 80 want to age in place (Gavin), but age related mobility issues significantly increase the risk of falls (Sebastião et al.). In the US, over 14 million falls are reported annually with up to 4000 fall related deaths each month (CDC). Their desire to age in place is challenged, but assistance is restrictively expensive with the national median cost of assisted living at $5,350 per month and home health aide at $6,292 per month (Genworth). With Senior Ally, our mission is to make aging at home safer and more affordable by reducing fall-related healthcare costs.

PROVIDE VALUE TO OLDER ADULTS:

As we age, reduced muscle mass and joint flexibility makes it harder to maintain balance and navigate obstacles (Ferreira et al.; Chien et al.). In the US, 24% of adults over 65 used a mobility aid in 2011, with numbers rising (Gell et al.). There are measurable changes to our gait, including reduced stride length and increased gait variability for fall risk prediction (Chien et al.; Thakurta et al.; Ferreira et al.). These can be tested in a clinic but are either observation-based and inaccurate or require extensive sensory equipment. Moreover, being observed by a physician in an unfamiliar environment can introduce further inaccuracies.

Therefore, we introduce "Senior Ally": a modular cane attachment that can provide real-time obstacle detection and gait analysis. Equipped with a 360 degree lidar, inertial

measurement unit, and pressure sensor, it can measure gait parameters like temporal feet position, cane orientation, and reliance on cane. Real-time data analysis on the ARM processor warns users of trip hazards like curbs and uneven surfaces through haptic feedback. The remaining data will be sent via Bluetooth Low Energy to the user's device for Google AI-powered gait analysis, providing insights for users and caregivers and suggesting custom exercises through Fitbit. Older adults are often late adopters of technology (Smith), so our device easily attaches to their mobility aid, something they are reliant on, encouraging regular use and effective data collection. Recognizing challenges in both product development and user adoption, we will utilize rapid prototyping and seek extensive and frequent user feedback.

BE A VIABLE BUSINESS:

As 68% of mobility aid users use a cane (Gell et al.), we will begin with a cane attachment. From existing products, CAN Go smart cane offers GPS tracking, health reports, and emergency calling services, but our device empowers users to take action to prevent falls by detecting changes in their gait and suggesting exercises. The IntelliCane developed by Vanderbilt University assesses fall risk in cane users using inertial measurement units. As of 2018, their algorithm predicted falls as well as a physician. We plan to incorporate a Lidar to gather accurate feet position data to measure the user's range of motion in addition to gait parameters. Moreover, Google has the potential to reach millions of users and train their model on a much larger data set, obtaining better results in both gait detection and targeted exercise recommendations (i.e. flexibility or strength) through the Fitbit app. Lastly, future versions will be designed to attach to other mobility aids or possibly even shoes, broadening our customer base.

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The global assistive technology market is projected to expand significantly (Yu). Senior Ally stands to capture a significant share by addressing the unmet needs of older adults through user-centered design and robust functionality. Although initial development costs are substantial, expected healthcare savings and value provided to users justifies this investment. Our revenue will come from direct sales, premium subscriptions (i.e. more personalized exercise recommendations), and partnerships with healthcare providers. Moreover, with a majority of older adults projected to be in low to middle income countries (WHO), we plan to leverage Google's worldwide presence to serve a global market and collaborate with local organizations to increase accessibility. Our modular device is scalable for mass production, and the intuitive, language independent interface simplifies worldwide adoption. Together, we hope to create a future where aging gracefully at home is within everyone's reach.

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