Week 1: Refining a Problem Statement

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# Problem Statement

Senior citizens live longer than ever before and want to defer moving into nursing homes until later in life. Transitioning into elderly care comes as a double edge sword. On the one hand, nurses can provide 24-hour supervision. This assistance could mean the difference between life and death (e.g., during a fall). However, on the other hand, the medical services are prohibitively expensive, nearing $90,000 annually (Tan et al., 2020). Additionally, these medical facilities lack the personalization available within one’s home. Further, specific individuals with diseases like dementia and Alzheimer’s require even greater levels of attention.

Traditionally, addressing the situation requires increasing human capital, such as adding more traveling nurses or family member oversight (Westergren et al., 2021). However, this solution increases health care costs and collects limited patient health samples. In addition, these infrequent visits might miss critical issues, especially with those most reluctant to relocate. Alternatively, researchers are exploring wearable IoT devices (Tun et al., 2021). These sensors provide mechanisms for requesting assistance and receiving continuous monitoring. Nevertheless, there are many limitations to wearable solutions. Most notably, the person must *remember* to wear them, which raises challenges for early-onset memory loss patients.

Modern solutions must bridge the differentiation between remaining in the home and still receiving the attentiveness typically found in assisted living facilities (Tan et al., 2020). When this gap narrows, it enables the patient to remain in familiar settings for more prolonged periods. That situation has numerous benefits, both psychologically (e.g., higher morale) and economically (e.g., deferring private health care costs). Medical facilities can address these challenges through real-time video monitoring services that analyze the patient’s actions and recommend care. For instance, patients with memory impairment might forget to empty the dishwasher, take medication, or bathe regularly. These scenarios are challenging to address through wearable devices. However, through computer vision, an in-home camera system transforms into a watchful eye that can spot those missing actions. After detecting an issue, the system alerts the person using Text-to-Speech (TTS) services (e.g., Amazon Alexa or Google Home).