

## Introduction

Dementia is the term used to describe a variety of different diseases and conditions that share the common symptom of causing progressive and irreversible decline of different mental functions (Huevel, 2012). This decline of mental functions is not a part of normal aging, and is instead caused by brain cells not being able to communicate with each other properly, which can lead to mental faculties, such as thinking, behavior, and feelings, to be affected abnormally (National Institute on Aging, 2019). Due to the complexity of the brain and different regions have the brain having different jobs and functions, different forms of dementia can be associated with different parts of the brain. For example, Alzheimer's disease, which is one of the most common forms of dementia (Mayo Clinic, 2019), causes damage to the hippocampus, the learning and memory center of the brain, which is why one of the earliest symptoms of Alzheimer's disease is memory loss (Alzheimer's Society, 2013).

Although dementia comes in a large variety of different forms, patients that suffer from dementia still share similar problems with other dementia patients. Things that would be considered trivial, such as preparing meals, keeping track of items, like keys, and remembering appointments can be hard or even impossible for certain dementia patients. Patients with dementia often have less control over their lives, and have to rely on the help of caregivers or other people. Another major ability that dementia patients might not have is the ability to effectively navigate indoor spaces. This is because traits necessary to navigate indoor spaces, such as memorizing the layout of a building, might be missing from dementia patients. This typically requires a caregiver to help lead them from place to place, which puts a strain on both the dementia patient, because they have to lose their independence, and the caregiver, because

they have to help the patient instead. In a research article that attempted to determine major problems facing both caregivers and dementia patients, a group of caregivers were asked to respond to problems they normally face as a result from taking care of a dementia patient. Of the 31 respondents to the problem of patients wandering or getting lost, 20 caregivers responded that getting lost or wandering is a slight problem or a big problem (Huevel, 2012).

Navigating in indoor spaces with technology is very different than in outdoor spaces, however. For indoor navigation, problems such as different wall thickness, multiple floors, and abnormal room layouts make already existing positioning systems, such as GPS, inaccurate in indoor spaces. Because of this, other forms of positioning are required. One method that would work in indoor navigation is getting position with Geolocation. Geolocation is technology that displays the position of a user through the use of the internet or a mobile phone (Cambridge University Press, 2019). Typically, Geolocation uses common, fixed points of internet or radio waves, such as WiFi Routers and Cell Towers, to calculate the position of a user. Geolocation is much better for getting an accurate position of a person than with relying on GPS.