DEVELOPMENT OF INDOOR AND OUTDOOR LOCATION TRACKING SYSTEM FOR ALZHEIMER’S PATIENT

Ooi WeiHan, Shahrizal I.M, Noordin A.

Space Application and Technology Development Division
National Space Agency (ANGKASA)

Ministry of Science, Technology and Innovation (MOSTI)
Outline

• Background
• Alzheimer Trigger, Tracking and Tracing System (ATTracT)
• Indoor Positioning System and test result
• Implementation
• Concluding Remarks
Dementia: Umbrella term used to describe a loss of mental ability that cause problem with memory, language skills and mental agility

Alzheimer’s Disease (AD): disease that affects the multiple functions of brain cells

Resulting in impaired memory, thinking and personality change

Affect adults at any age, but usually occurs after age 65

47 million people live with dementia worldwide now, and expected to triple to 135 million by 2050

123,000 peoples in Malaysia with dementia in 2015
Alzheimer patient
Report of missing..

• 6 in 10 people will wander
• 70% of those lost 3 times or more
• 46% of wanders not found within 24 hours involved in accidents

“There's approximately 125,000 search-and-rescue missions where volunteer teams are deployed ... for missing Alzheimer's patients every year,” said Kimberly Kelly, founder and director of Project Far From Home, an Alzheimer's education program designed for law enforcement and search and rescue personnel.

The estimated number of reported cases is conservative, because not every department contributes to the reports, she said.

“With 5.5 million people with the disease, and 70 percent wandering away at least
In Malaysia...

Senior citizen with Alzheimer's missing since Tuesday evening

Alzheimer's sufferer missing for a week

82-year-old man with Alzheimer's goes missing in Penang

Man with Alzheimer's Disease still missing after a week

Hidap Alzheimer Dan Dementia, Warga Emas 87 Tahun Hilang Selepas Keluar Dari Rumah
Alzheimer Trigger, Tracking and Tracing System (ATTracT)
• ANGKASA has developed ATTracT for Alzheimer’s community.

• Integrate the Wi-Fi network capability to determine the location of a person with AD for the both indoor and outdoor environment.

• It aims to provide caregivers with an alternative method of monitoring the movement and improving the safety of their loved ones who have AD.

• The movement of the person with AD will be monitored using a wrist watch enabled with GPS while the guardian will be able to track and monitor the person in real time via their smart devices.

• Social Innovation Program - aims to benefit the community at the grassroots level by exploiting satellite technology.
1. Transmission of signals include position information through a GNSS/WiFi-capable device to a central server.
2. The central server will handle a map display and shows the location of the device in real time.
3. SIM card is used to connect and identify information about the user and local WiFi network.
Software

- **Phonegap**: To develop mobile apps in Android platform
- **Microsoft Visual Studio**: Web based application development
- **PostgreSQL**: Database development
- **Windows Server**: Server operation system
GPS has made a good impression in terms of accuracy and is the preferred location-based system for outdoor positioning.

However, GPS signals don’t work indoors or in narrow streets as they tend to attenuate and scatter by roofs and walls.

Indoor positioning is more complicated due to need certain infrastructure to be in place indoor.
Available Indoor Positioning Technologies

The technologies used today for indoor positioning differ in terms of **accuracy** and **costs**.

**Wi-Fi**
- Not requires investing in specialized hardware, where existing Wi-Fi infrastructure can be used
- Large range coverage (up to 150m)
- Enabled Wi-Fi is sufficient
- Detects floor level

**Bluetooth**
- Maximum range of coverage is 30m indoors
- 1-3 meters accuracy

**RFID**
- Demonstrated its capability in location-based system
- Cost of deploying and implementing could be high
• Most often used for indoor navigation system
• Each available Wi-Fi access point transmits specific data
• Calculate the current location of the end user device by using a RSSI (Received Signal Strength Indication) and MAC address
• Only functions with Android devices due to technical restrictions (Not for iOS devices)
ATTracT - Test result

WiFi mode – On

WiFi mode – Off

Actual location
Indoor positioning accuracy
~ 20 meters
i. Mobile apps for the caregivers to monitor the patient, setup virtual boundary of the activity zone and **time activation** according to the **schedule every single day**

ii. Alert would be sent to the smart devices of the caregivers and patient’s movement history could be saved

iii. Real-time **monitoring system** for caregivers centre to track movement of all patients simultaneously
ATTracT- caregiver centre

Monitoring system setup for observing user movement
Virtual boundary setup in care centre for observing user movement
System allows to search the patient’s location
Generate the trace record for each patient
Project Implementation with Alzheimer’s Disease Foundation Malaysia
Understanding the real needs and requirements to existing practices at the center

To evaluate the effectiveness and benefits of the systems developed for AD

To evaluate the efficiency / accuracy of indoor positioning system using Wi-Fi
A LIFELINE FOR ALZHEIMER'S PATIENTS

Tracking Alzheimer's disease patients can be challenging for caregivers, but a new system is making it easier. The ATTract system, developed by the Science, Technology, and Innovation Ministry, uses GPS technology to monitor the location of Alzheimer's patients. This system helps caregivers keep track of the patient's movements and ensures their safety at all times. The system is designed to alert caregivers when the patient is outside their designated area. This innovation is a welcome addition to the tools available to caregivers and helps to improve the quality of life for individuals with Alzheimer's disease.
Concluding Remarks

• This development provide caregivers with an alternative method of monitoring movement of AD for both indoor/outdoor
• Improve the safety of the AD patients by reducing the risk of getting lost and hurt in the process
• Benefit the community at the grassroots level by exploiting the space and GNSS technology
Thank you