Dementia Assistive Device

DESIGN FOR GOOD

MMAI 803 -Team Leggett

Dementia in Canada: By The Numbers

Over 500,000

Prevalence of dementia in Canada (2022)

76,000

Diagnosed every year

1 in 5

Canadians having experience caring for someone living with dementia

USD $19.14 billion

Estimated growth to $29.6billion by 2027

Global dementia care products market size (2020)

Targeted Stages of Dementia

Mild dementia

- Short-term memory loss, interferes with daily activities
- Moderate difficulty solving problems
- Difficulty with daily activities and hobbies, especially complex ones

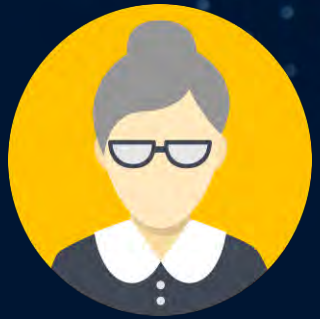
Moderate dementia

- Most common in age >65
- Increased irritability, anxiety and depression
- Disorientation with respect to time and place, impaired judgment
- Little to no independent function at home
- Fewer interests, brain fog

The Stakeholders

Caregivers

- Paid and unpaid
- Assist with daily life
- Can overwhelm
- Personal and situational knowledge

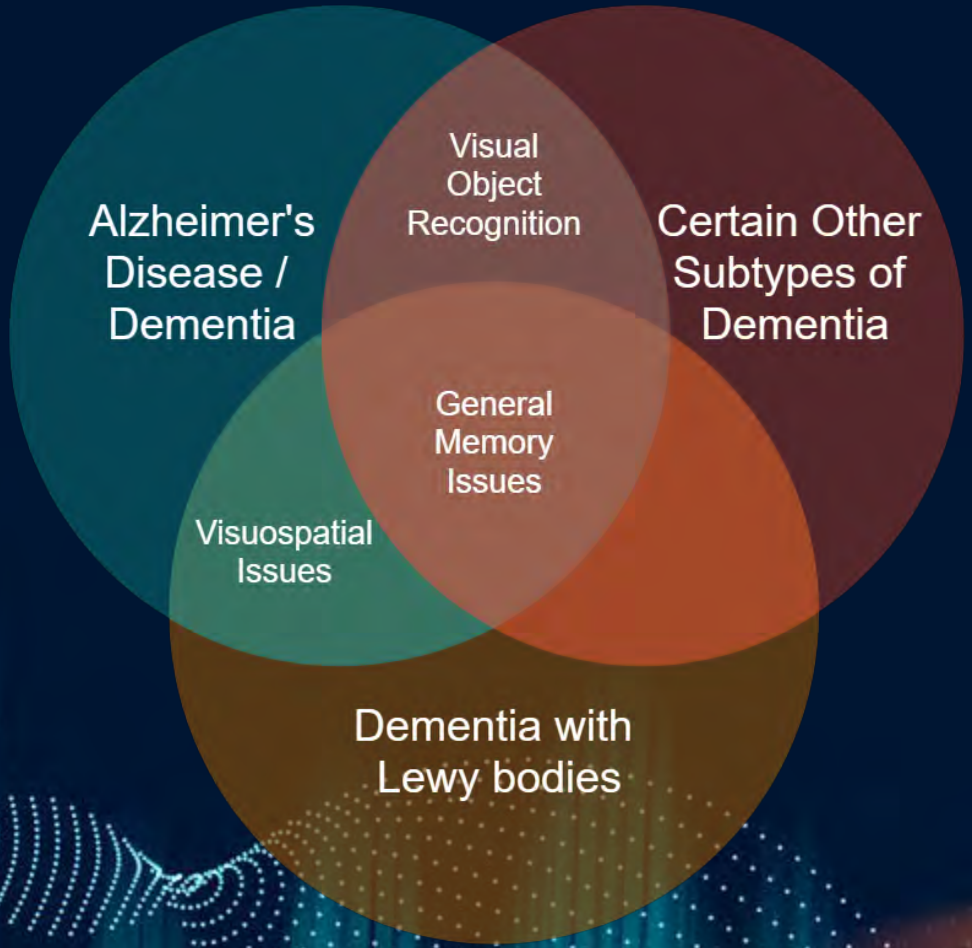


Persons with Dementia

- Gradual loss over years
- Change in identity, motivation
- Cognitive, behavioral declines

Medical Professionals

- Assess dementia stage, mental-state
- Help set expectations
- Advise on appropriate technologies



Where can we help?

Looking at the intersection of symptoms between different dementia subtypes...


moderate
disease
customizable
reduce
dignity
reliability
safe
question
burden
mild
device
quality
nlp
natural
smartphone
personal
medical
audible
activities
augmented-reality
ease
computer-vision
visual
memory
tablet
high-contrast
visuospatial
answering
life
assist
progressive
object
language
processing
loss
speech-to-text
vqa
help
daily
programmable
multi-lingual
independence
impairment
recognition
wearable
caregiver
alzheimer's
loved-one
dementia

The Solution

Early & Middle stage Dementia Assistive Device

Improve quality of life by making daily activities easier

EM-DAD is a non-diagnostic assistive device which helps improve visual object recognition meant to allow those with certain forms of dementia to regain some independence

Augmented object

Visual Context

Question Context

EM-DAD

VQA: NLP & CV networks

“Did you mean this wallet?”

An Extended Service Model: Handling Personal Items

Visual object detection algorithms are trained on a finite set of object classes

Offering customizable object subclasses could support:

- Personal object recognition
- A favorite possession
- E.g. a wallet, purse, piece of art

The product can be tailored and can be adapted over time

Short Term - Prototyping

Technological

*Standard data
*Text and Image
*Smartphone
*Tablet

Language

*Single text language support (English)

Partnership

*Solicit feedback from dementia stakeholders

Funding

*Low (MVP)

Medium Term - Enhancements

Technological

*Tailored Data
*Speech Control
*Video Support

Growth

* Market Growth: retain and grow
*R&D: Wearable form, Additional Languages

Partnership

*Feedback from dementia stakeholders
*Cultivate some partnerships

Funding

*Medium (Focusing on hiring and acquiring data)

Long Term – Full Rollout

Technological

*Wearable form
*Multiple data to reflect dementia severity
*Multi-lingual support
*Software update (OTA)

R&D

* Market Growth: Introduce new features to attract
*R&D: Other verticals (Dyslexia)

Partnership

*Healthcare
*Government
*Manufacturing

Finance

*High

Invest back into R&D and reaching new market segments

Who is the Competition?

The status quo...

- Paid and unpaid caregivers
- Adding physical labels, e.g. sock drawer
- Colour-coordinated arrows directing the path to the bathroom
- Non-technical solutions; occupational therapy

Limited Assistive-Devices

- Tablet-enabled visual mapping software like MapHabit to help with ADL
- GPS trackers
- Robot vacuums
- Picture phones use a pictorial interface

Resources

EXPERT INFORMATION

Alzheimer Society

CLINCAL ENVIRONMENT

Adult Day Care Centers

DATASETS

LVIS

PhraseCut

CLEVR-Ref+

FUNDING

Dementia Strategic Fund
2019 Budget over 5 years

Risks & Mitigation

RISK	MITIGATION
Visual Question-Answer Limitations	Medically informed responses
Patient ego / Undiagnosed	Dementia Awareness / Therapy
Wariness of technology	Marketing
Speech recognition reliance	Possible partner solutions e.g.SpeeChin
Data privacy	Security / Legal Terms & Conditions

Partners

Healthcare
Partners

Government
Partners

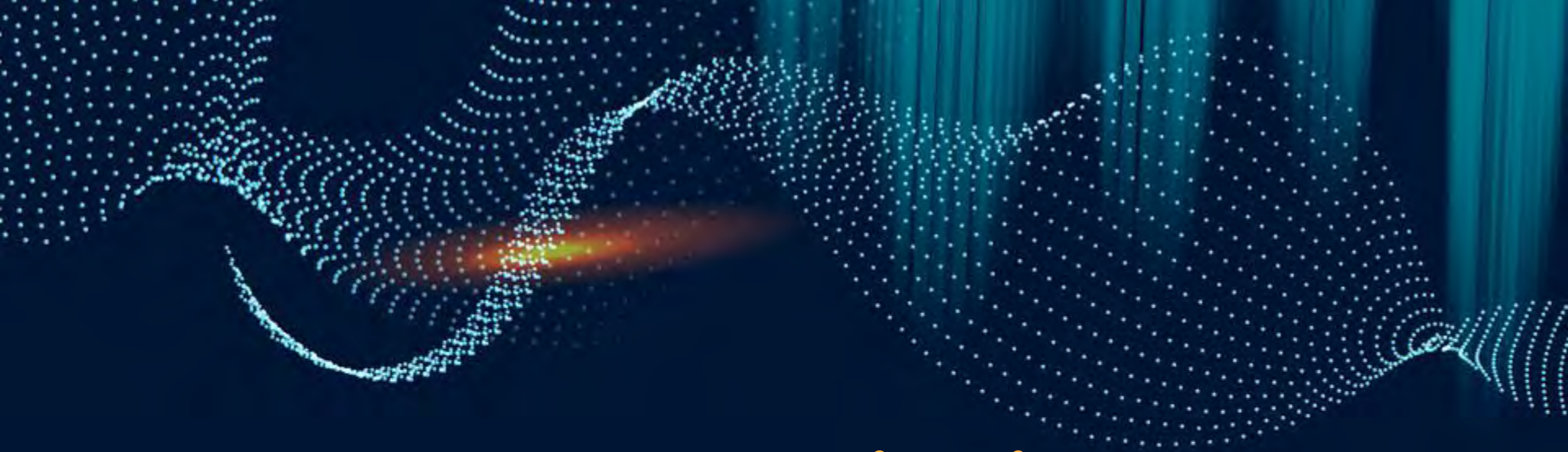
Equitable distribution channels

Company
Partnerships

NeckFace

SpeeChin

Wearable Manufacturers



Thank you for listening!

Q&A

Alternate, Adjunct Application?

Persons with dementia can have difficulty articulating a specific vocabulary word

Could it be possible to use EM-DAD to translate words or phrases in an embedded vector space?

"Where is my ***hand-clock***?"

"Where is my ***wrist-watch***?"