Working Notes

# Introduction

* Expansion of your project title
* Clearly defined problem statement
* Research question or hypothesis
* A clear statement of your purpose – Why did you carry out the research? Why are you writing this report?
* Scope of your research
* Define any key terms which aid understanding in the introduction

# Lit Review

Referenced review sources relevant to your project.

Critically evaluate relevant sources to demonstrate to your readers how your research fits within a larger field of study.

It will allow discovery of current ideas, current practice and processes to support the Project’s aim.

You need to set your work in the context of previous work with your field of study or problem to solve and identify any gaps in current practice and/or literature, explaining how you intend to address them.

# Methodology

Alternate research question: What considerations need to be made when developing a dementia care technology for the elderly?

* Discuss and justify all aspects of the methods used to undertake the project
* Effectiveness
* Suitability
  + Compare to outlined requirements
* Robustness
  + Count frequency of errors during example use (test plan)
  + Accuracy of TTS
  + Correctness of intent detection
  + Speed of transcription
* Agile
  + Manifesto

# Stage 1

## Implementation

* Mozilla Deepspeech
  + Keyword spotting/improved speech recognition not extensively investigated due to time constraints
* Social vs Task orientation
  + Task oriented for functionality, social-oriented for engagement exercises/games

Privacy

* Voice Synthesis

• discussion on any issues/problems that arose and how each was resolved.

## Evaluation

For the VA to be successful, each component – STT, Intent Detection, and TTS – of the initial architecture must be sufficiently robust. To assess this, a sample of commands will be tested through a comparison of its accuracy and speed of transcription of live audio.

Given a selection of commands, the voice assistant

* Testing
* Speed benchmarks
* Raspberry Pi VM
* Address successes of implementation
  + Speech model can be updated at later date
* Address limitations of implementation
  + Intent detection

:Extensibility

- Compare amount of features developed with planned ones? Can't be done before other development

:Capabilities

- Compare features to commercial alternatives

Can't be done before other development

:Portibility

- Compare specs to potential hardware (Raspberry Pi)

* Feasibility

The STT results show poor performance in both speed and accuracy of the given phrases.

# Stage 2

1.1.1 Memory Skills

Strengthening memory skills is vital to slowing cognition loss. Poor memory is a key indicator of dementia and among the most common

Gates et al. (2011)

Wang, Xu, and Pei (2012)

Prerequisites

Obi,Toshio;Ishmatova,Diana;Iwasaki,Naoko 2013 – Gaming effective among Japanese adults.

# Stage 3

:Ease of use

:Accessibility

:Simplicity

# Stage 4

• The current state of voice synthesis is also lacking and can be hard to relate to for users who require companionship

# Evaluation

This section will evaluate both the process and products of your project based on your previously developed criteria.

This section summarises and provides evidence of what has been achieved and will reference additional materials in the appendices.   For projects that test a theory or concept, it will analyse the results of the investigation in relation to original expectations and draw conclusions about the theory or concept.

Critical appraisal of the project

Lessons learnt

Evaluation (with hindsight) of the project outcome and the process of its production (including a review of the plan and any deviations from it)

Note that the ‘products’ of your project include not just the principal artefact that you have developed, but also design and other documentation associated with the development process.   It is also appropriate to discuss the results of any external validation of your artefacts in this section.  The evaluation of the process should consider all elements of your project methodology as well as project management issues

# References

* A list of citations for sources you have referred to in the body
* Single line spaced

• Metrics

• Techniques

• Methodology

Sources not referenced in the body of the report go in bibliography

appendix should be a good overview of whole project

# General

A major factor that will dissuade use of the VA is incapability. Patients cannot be expected to understand the limitations of the VA, meaning a robust and capable tool should be created initially to encourage adoption.

Alexopoulos *et al.* (2002) describe the relationship between depression in the elderly and comorbidity with other ailments including Alzheimer’s and dementia. They found evidence in literature that early to mid-life depression increases the risk factor of Alzheimer’s and that late-life depression is a potential indicator of dementia.

Kemp, Ball, and Perkins (2013) examine the boundary between formal and informal care, noting the conflicting viewpoints in literature regarding how the two interact. They suggest a complementary and evolving “convoy” of care that adapts to changing needs as opposed to a supplanting model wherein formal care assumes responsibility when informal care cannot.

Even healthy elderly users have difficulty using these products comfortably (A. Reis*et al.* 2018). These products are primarily cloud-based, leaving users unable to utilize many of their features if disconnected from the internet.

In addition to aiding fully cognitive elders in daily life, the discussed technologies have many benefits for people living with dementia and AD.

It has been extensively shown that non-pharmacological approaches to treating dementia such as cognitive behavioural therapy, reality orientation, and validation therapy are prospective solutions.

Before considering the needs of users living with dementia, it is important to consider the challenges faced by all elderly users of technology. Elderly users of technology are often referred to as digital immigrants.

Damant *et al.* (2016) categorise technologies as Mainstream ICT – consisting of mobile phones, the internet, and other technology used by the general public – and Remote Care – vital sign monitors, cognitive and physical fitness trackers, and other assistive technologies.

A review by Koumakis *et al.* (2019) found recurring evidence of the benefits of technology in improving the lives of people living with dementia and their care-givers. They found examples of mobile applications for diagnosing and monitoring patient conditions, supporting patient daily activities through reminders, location tracking, and educating care-givers.

The global aging population is a common motivator of research into the needs of elders. The prevalence of Dementia in this population has placed dementia care at the forefront in the design of these care solutions.

(Dixon *et al.* 2020)

• UI

• Navigating a world was tricky

(Plaza et al. 2011)

however few participants in the studies reviewed by Siegel and Dorner (2017) expressed concerns over digital privacy in AL technologies.

Galende *et al.* (2021) conducted a literature review with unknown parameters.

(Lockerbie and Maiden 2020) The created framework was designed to be interpretation of existing dementia quality of life work by Lawton (1994).

(Palmer et al. 2016)

* Virtual assistant can offer brain-training exercises that could help elderly users keep focused
* Ethical concerns – Collecting and storing data
* Product implementation?: Raspberry Pi or Mobile

Considerations to make for users living with dementia:

* Poor speech makes speech detection difficult
* Poor understanding of technology and confusion means commands may be complex or indirect
* Certain terminology or phrasing should be used
* The current state of voice synthesis is also lacking and can be hard to relate to for users who require companionship
  + Research shows that companionship is important
  + Historically, users have been able to relate to even less advanced AI.
* The ability to perform critical tasks without requiring an internet connection. Current options are primarily cloud-based, leaving vulnerable users unable to utilize them if web connection goes down.
* Be able to infer a task from a less explicit statement. For example, a confused question such as, “Where did Alice go?” while Alice is not present should be treated as a command to call Alice.
* a description of how verification and validation were applied at these stages

Themes:

* Dementia
* Challenges
* Quality of Life
* Independence
* Usability
* Carer

Initial literature review method failed and a newer approach was needed.

Many studies of dementia care make note of the burden placed on informal care-givers. As such, this group is often considered when developing frameworks for dementia care plans. The proposed VA could offer benefits and relief to this group as part of its design.

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| Intro | 500 | 500 |
| Lit Review | 1500 | 2200 |
| Methods | 500 | 1000 |
| Planning | 300 | 450 |
| Basic Voice Assistant | 1500\* | 1500 |
| Feature 1 | 1500\* | 1000 |
| Feature 2 | 1500\* | 750 |
| Feature 3 | 1500\* | 750 |
| Evaluation | 1000 | 700 |
| Further Research | 100 | 130 |
| Conclusion | 300 | 200 |
| \* |  |  |
| Intro | 100 |  |
| Research | 500 |  |
| Design | 300 |  |
| Implementation | | 300 |  |
| Evaluation and Discussion | 300 |  |
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