

Developing a Therapeutic Video Integrating Gamma Therapy and Heart-Coherent Breathing

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INTRODUCTION/USER NEEDS

In 2020, approximately 6.9 million people were living with Alzheimer’s disease (AD) —a number projected to rise to 14 million by 2060 [1]. AD is a progressive neurodegenerative disorder that gradually impairs memory and cognitive function. One key factor in its progression is the accumulation of amyloid-beta (A β) plaques, which accelerate cognitive decline.

Recent research highlights the potential of gamma-frequency stimulation and sound therapy in reducing A β accumulation, in some cases up to a 57.96% reduction [2]. Additionally, heart-coherent breathing exercises have shown promise in further reducing A β plaque, offering a potential non-pharmacological approach to slowing disease progression [3]. However, these therapeutic techniques have not been combined for a possible additive benefit, and existing devices delivering these techniques may be cost-prohibitive or too technically challenging for many older adults. **This applied project aimed to develop a prototype of an open-source video to address this need.**

User Needs:

- Non-Invasive
- Easily accessible
- No clinical training required
- Cost-friendly
- Reduces the amyloid-beta plaque
- Clear instructions
- Small time commitment

APPROACH

Goal: Working prototype of an open-source video combining three non-pharmacological and non-invasive approaches

- Gamma Frequency: 40 Hz
- Gamma Sound: 40 Hz
- Heart Coherent Breathing: 5.5 seconds inhale and 5.5 seconds exhale

Validation: The System Usability Scale (SUS) was used to determine how well the prototype would address user needs.

SUS = 10-item questionnaire to evaluate a system’s functionality and navigation. Items are rated on a Likert scale of 1=Strongly Disagree to 5=Strongly Agree.

Score Breakdown:

<50 needs Re-evaluation
50 – 68 Functional
68 – 75 Acceptable
75 – 85 above average
>85 exceptional

| | Requires Training to Operate | Non-Invasive | Recommended “dose” of treatment | Cost | Can reduce amyloid-beta plaque buildup |
|---|------------------------------|--------------|---|--------------------|--|
| Transcranial Magnetic Stimulation (TMS) | Yes | Yes | 36 sessions over 6 – 9 weeks [4] | \$6k - \$15k [5] | Yes |
| Transcranial Direct Stimulation (tDCS) | Yes | Yes | Daily sessions of 20 – 30 minutes, at least 10 recommended per day for 2 – 10 weeks [6] | \$21k - \$105k [7] | Yes |
| AlzLife Video | No | X | 1 hour a day | \$0 | Yes |
| Our video | No | X | 1 hour a day | \$0 | Yes |

SYSTEM USABILITY SCALE (SUS) [9]

“I think that I would like to use this system frequently.”

“I found the system unnecessarily complex.”

“I thought the system was easy to use.”

“I think that I would need the support of a technical person to be able to use this system.”

“I found various functions in this system were well integrated.”

“I thought there was too much inconsistency in this system.”

“I would imagine that most people would learn to use this system very quickly.”

“I found this system very cumbersome to use.” (reverse-scored)

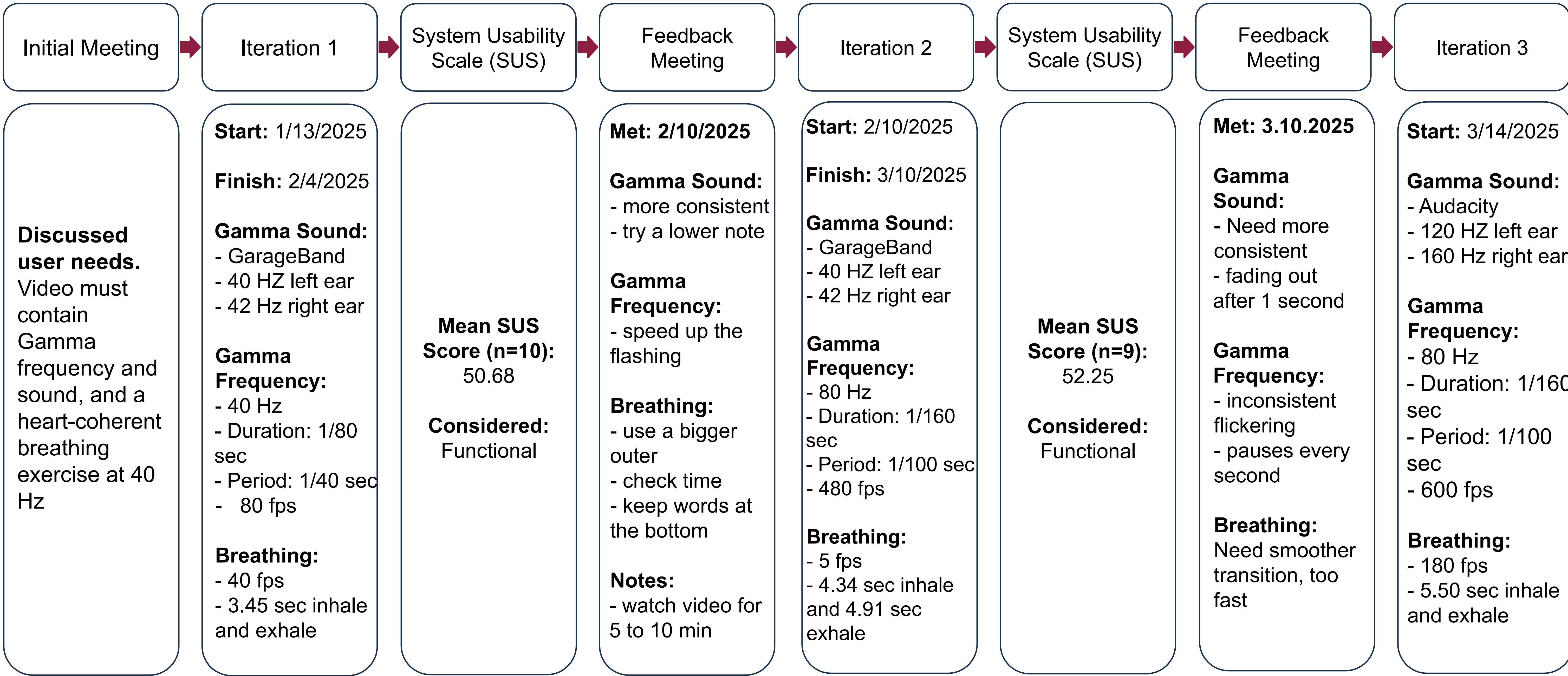
“I felt very confident using the system.”

“I needed to learn a lot of things before I could get going with this system.”

Rated by user from 1=Strongly Disagree to 5=Strongly Agree

Future Work: The prototype is now ready for pilot testing in clinical populations.

RESULTS



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