Multi-sensory TangiBalls Game for People Living with Dementia

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Americans over 65 years old are living with dementia in 2021
Dementia causes social isolation, which leads to many other diseases as well.

- lack of social interaction
- stigmatization
- cardiovascular disease
- functional decline
- depression, etc
WHO ARE WE DESIGNING FOR?

- People living with dementia (Early Stage Alzheimer’s Patients)
- Caregivers and loved ones
LITERATURE REVIEW

- Combined pharmacological and psychosocial therapy approach is most effective care
- Top psychosocial therapies shared top 5 themes
  - Multisensory Stimulation
  - Reminiscence
  - Cognition
  - Movement
  - Socialization

Yet, a limitation is difficulty to maintain participant interest.

⇒ Opportunity to explore Gamification
DESIGN QUESTIONS

How might a tangible user interface give new forms to the social interaction between the dementia patient, caregivers, and loved ones?

How might the interactive experience support reminiscence?

How might the interactive experience improve users’ emotional well-being?
ITERATIVE DESIGN JOURNEY

- CONCEPTS EXPLORATION
- UX RESEARCH
- LOW-FI PROTOTYPES
- HI-FI PROTOTYPES
- TESTING
- TESTING

LIT REVIEW
BRAINSTORMING

Low-fi prototypes and testing

High-fi prototypes and testing

Iterative design journey

UX Research

Testing
USER RESEARCH: Holistic View of the Patient

**Expert Interview**
Validate our assumptions from Lit Review

**Caregiver Interview**
Understand firsthand dementia care experience

**Observational Study**
Observe gameplay in a group setting
USER RESEARCH: Holistic View of the Patient

Expert Interview

- Narrow scope to early stage Alzheimer's
- No right or wrong answer
- Stimulate all 5 senses
- Need to strengthen bonds
USER RESEARCH: Holistic View of the Patient

Caregiver Interview

- Activities increase patient well-being
- Neutral setting for activity
- Ask for more stimulation as an improvement
USER RESEARCH: Holistic View of the Patient

Observational Study

- Facilitator role
- Low barriers to play
- Emotional connection to interactive objects
DESIGN OPPORTUNITIES

Neutral Language
Do not try to test abilities

Player Equals
Treat all as equals

Low Barrier to Entry
Make it easy to retain interest and participation

Tangible Objects
Evoke emotional connection

Multi-sensory Stimulation
More ways to trigger memory

Enjoyable & Fun Experience
Increase social bonds
Introducing

TangiBall

A multi-sensory game designed for people with dementia to bond with their caregivers via a shared reminiscence.
GAME COMPONENTS

Game setting
- Home
- Care facilities

Board tiles (themes)
- Community,
- Nature
- Celebration

TangiBalls
Multisensory stimulation balls
(sound, smell, touch, visual)
We used **Arduino** input/output circuits to build some tangible UI objects (TangiBalls).
EVALUATION STUDY

Evaluation Study at the Seniors’ Day Care Center with 2 Professional Caregivers
01  MULTISENSORY STIMULATIONS

02  OPEN-ENDEDNESS OF THE BOARD TILES

03  FOCUS ON FACILITATOR

04  DESIGN FOR LONGEVITY AND FLEXIBILITY
TangiBall gives new forms to the social interactions between people with dementia and their caregivers and loved ones.

- Multisensory Stimulation
- Reminiscence

Gamification
Multisensory

TangiBalls trigger positive emotions and stories
Multisensory
TangiBalls trigger positive emotions and stories

Digestible & Accessible
design facilitates shared reminiscence and bonding
Multisensory
TangiBalls trigger positive emotions and stories

Digestible & Accessible
design facilitates shared reminiscence and bonding

Adaptable
game play open the door to limitless applications
THANKS

Do you have any questions?

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FUTURE WORK

Facilitator Manual

Longevity of Game Components

Longitudinal Study with Dementia Patients
Expert Interview

- Narrow scope to early stage Alzheimer's
- No right or wrong answer
- Stimulate all 5 senses
- Need to strengthen bonds
Caregiver Interview

- Activities increase patient well-being
- Strain and logistics of everyday care
- Ask for more stimulation as an improvement
Observational Study

- Facilitator Role
- Low barriers to Play
- Emotional Connection to Tangible Objects