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Preliminary diagnosis of Alzheimer's disease using Virtual Reality

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Alzheimer's Disease

- Alzheimer's disease is a global challenge.
- AD is a brain disorder characterized by changes in the brain that lead to the deposition of certain proteins.
- Subtype of dementia.
- Main symptoms: Memory Loss, Cognitive Decline, Behavioral Changes, Difficulty with Daily Tasks.
- Impacts the entire family as the patient becomes unable to perform daily functions.



Early Diagnosis Is Crucial

- Helps slow disease progression.
- Improves quality of life for patients.
- Facilitates appropriate treatment.

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Current Preliminary Diagnosis

- Current assessments include quizzes, memory tests, and motor skills evaluations.
- Preliminary assessments for AD lack precision.
- Additional evaluations often needed for accurate diagnosis.
- Current assessments are limited by physical space and fail to accurately mimic daily life.

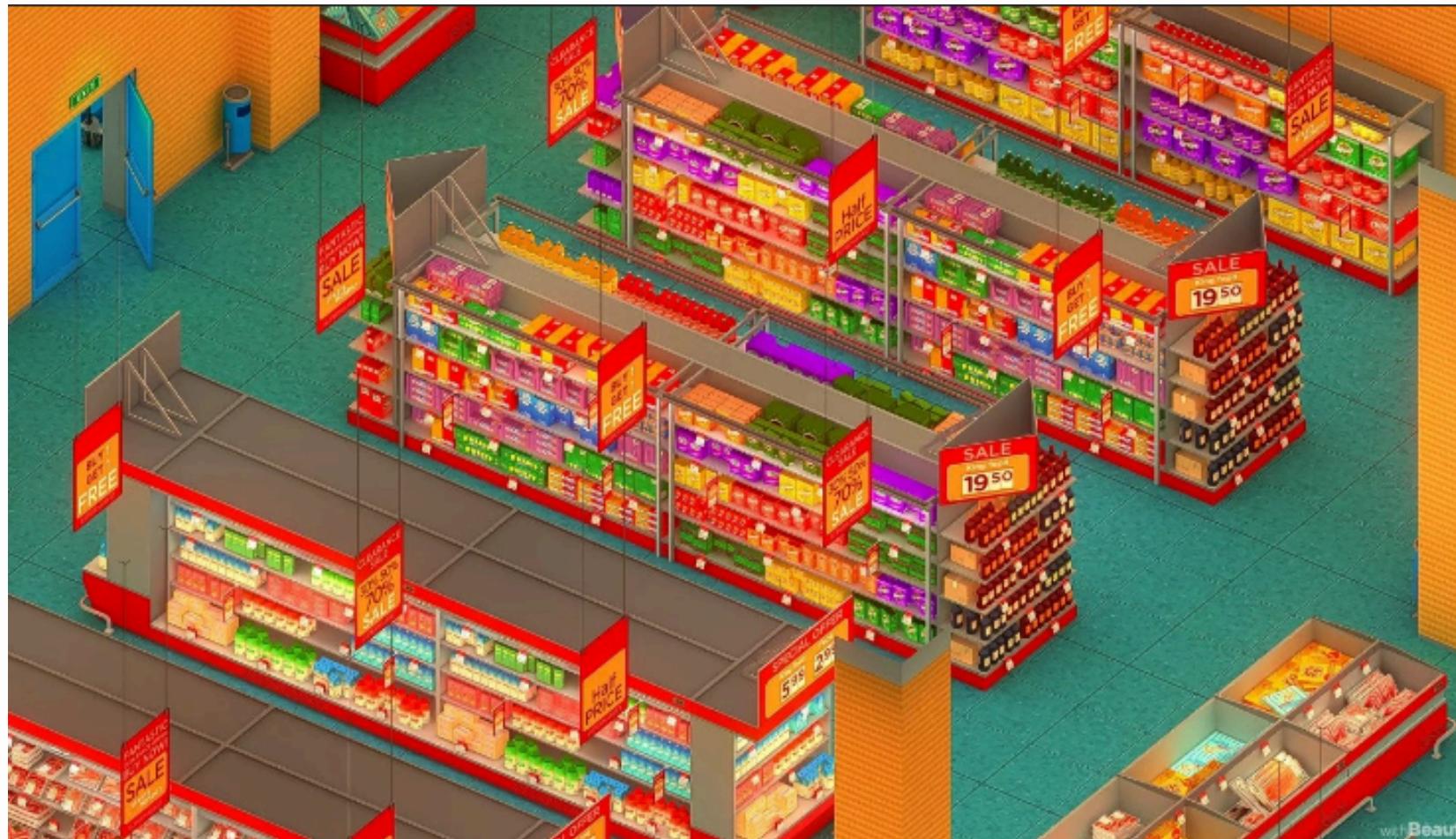
VR Test

- VR technology can effectively simulate reality.
- VR assessments are proven successful in preliminary AD diagnosis.
- Additional assessment for diagnose.
- Simulate the routine functionalities.
- Aims to improve accuracy.



The Virtual Supermarket Test (VST)

- Supermarket VR test aims to assess cognitive function in a realistic environment.
- Participants navigate virtual supermarkets, completing tasks akin to real-life shopping.
- Test evaluates spatial navigation that differ AD and other dementia diseases.
- Got few versions. proven as a good AD diagnose.
- The subject watches several short videos and is required to replicate the route.
- Customized VST in aim to simulate better the israeli envirment.



Quick Summary

**Important
Preliminary**

Slowing
propagation

Hard to Diagnose

AD or bad
memory?

**VR
assessments**

Simulate reality
efficiency

**Carmel
Hospital**

Adapt existing VR
assessment

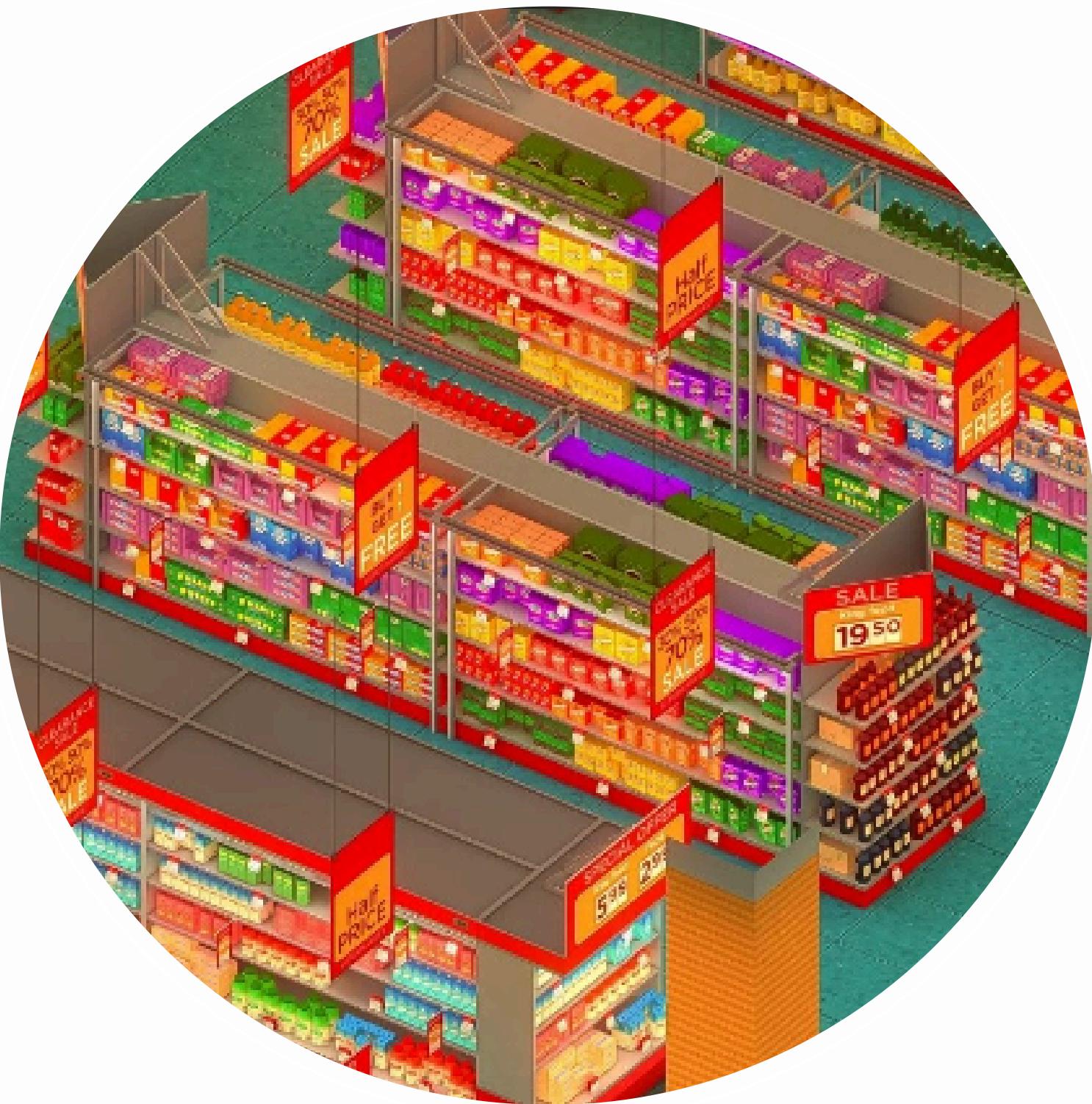


PRODUCT



Product Description

- Navigation in a Supermarket Virtual Environment.
- The subject watches a short video displaying a route and selects the correct product.
- While navigating, the subject answers the phone when it rings.





Product

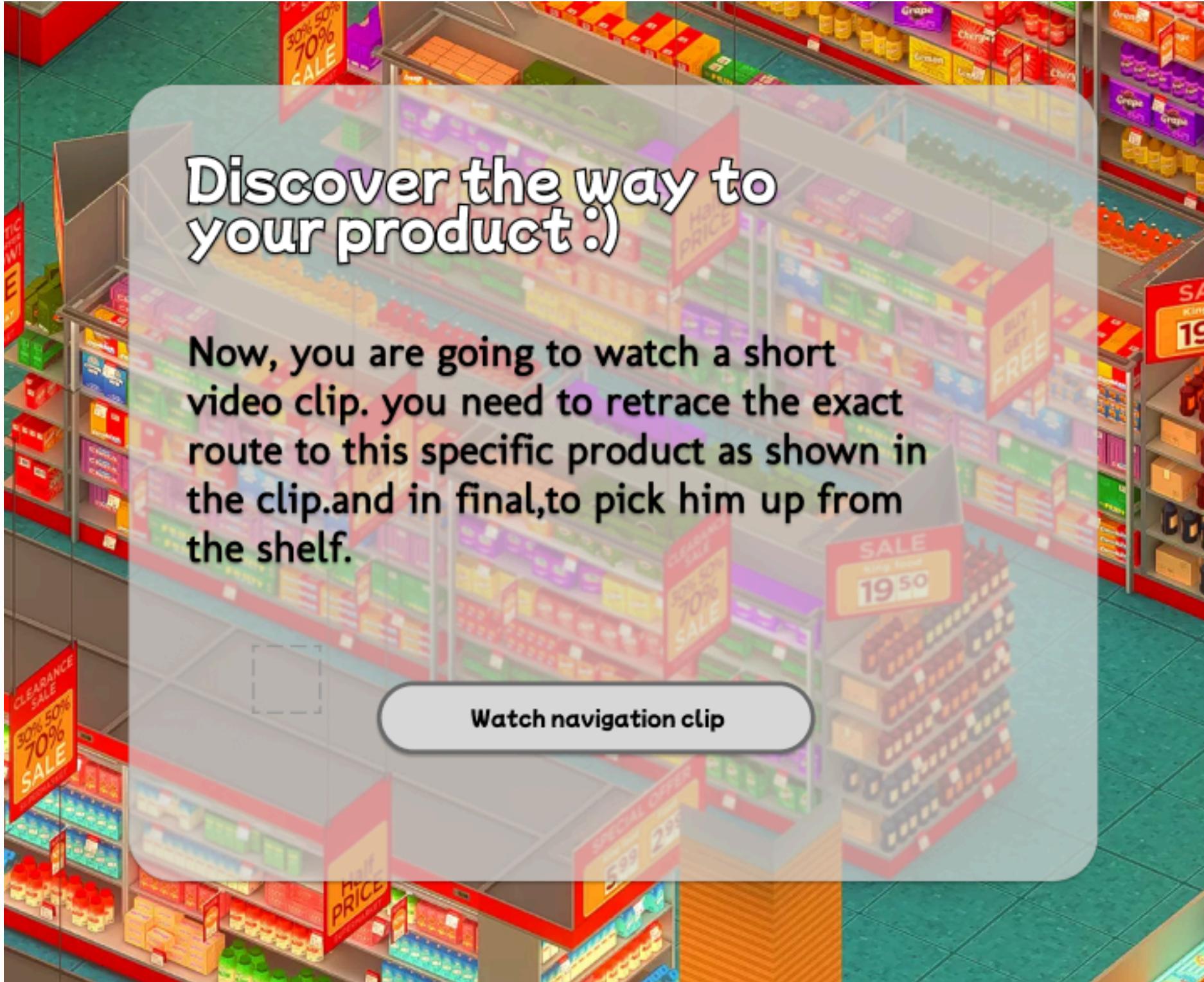
Screen Flow





Product

Screen Flow

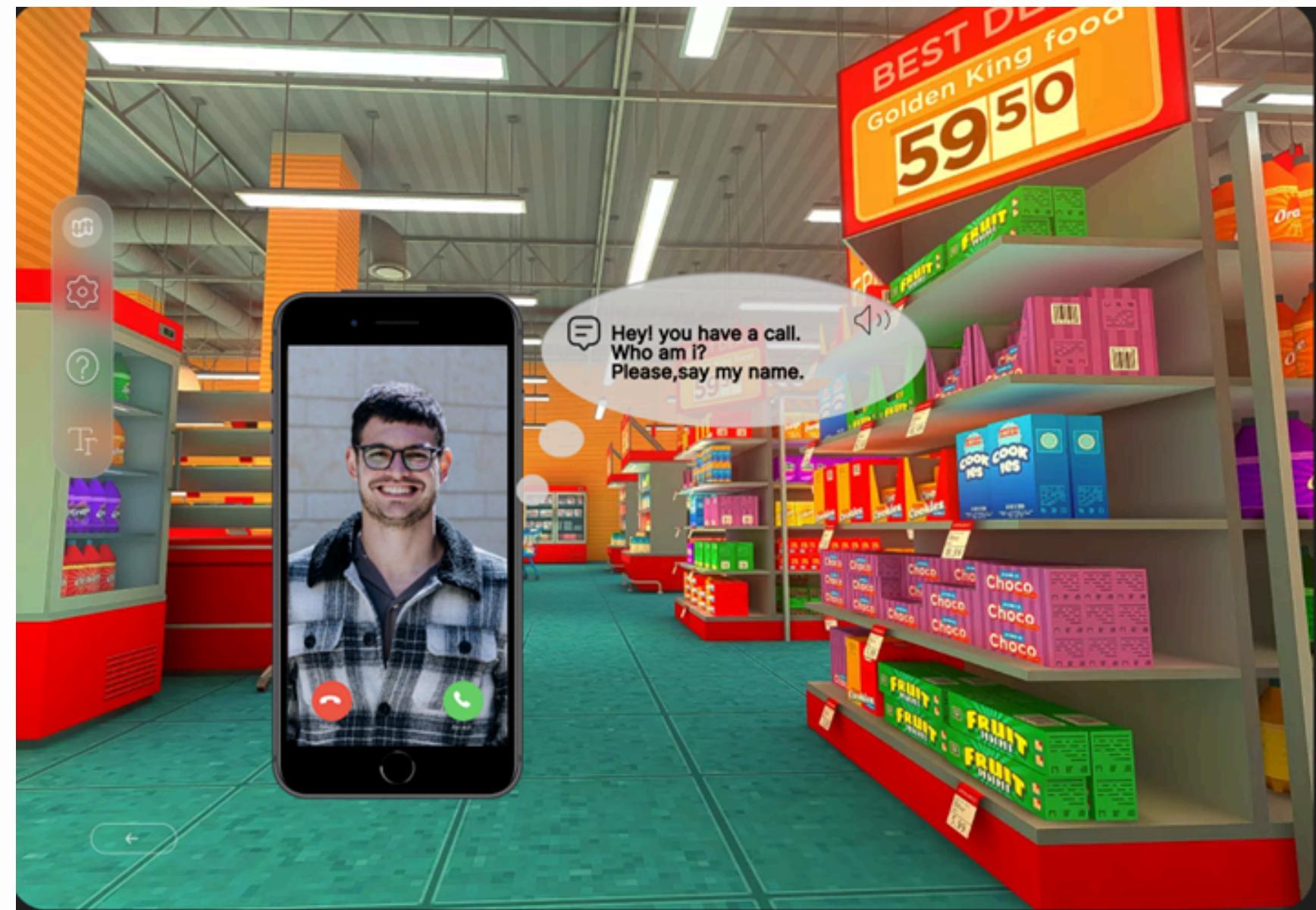


Phone Call Challenge

During the test, a smartphone displays photos, and the subject is tasked with identifying and naming the family member shown in the photo.

measured:

- Correct or Incorrect identification.
- The time it takes him to identify/continue.
- emotional respond.



Product- Measured Variables

- Wrong turns.
- Collisions with shelves or items.
- Frequency of returning to the same point.
- Monitor the frequency of errors made during tasks.



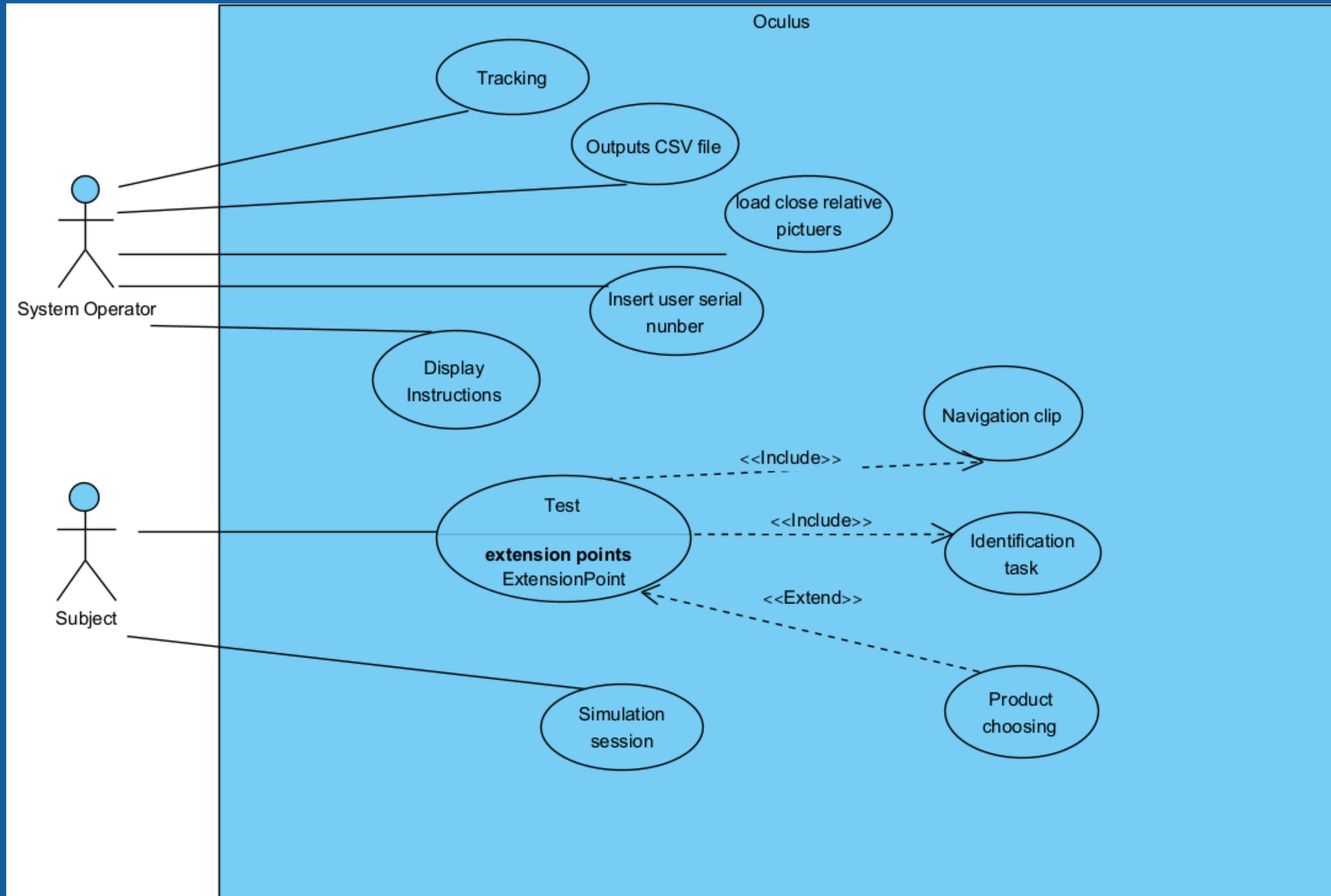
Unique Adaptations

- Time limit: 5 minutes
- Realistic environments with israeli products
- Identification Challenge

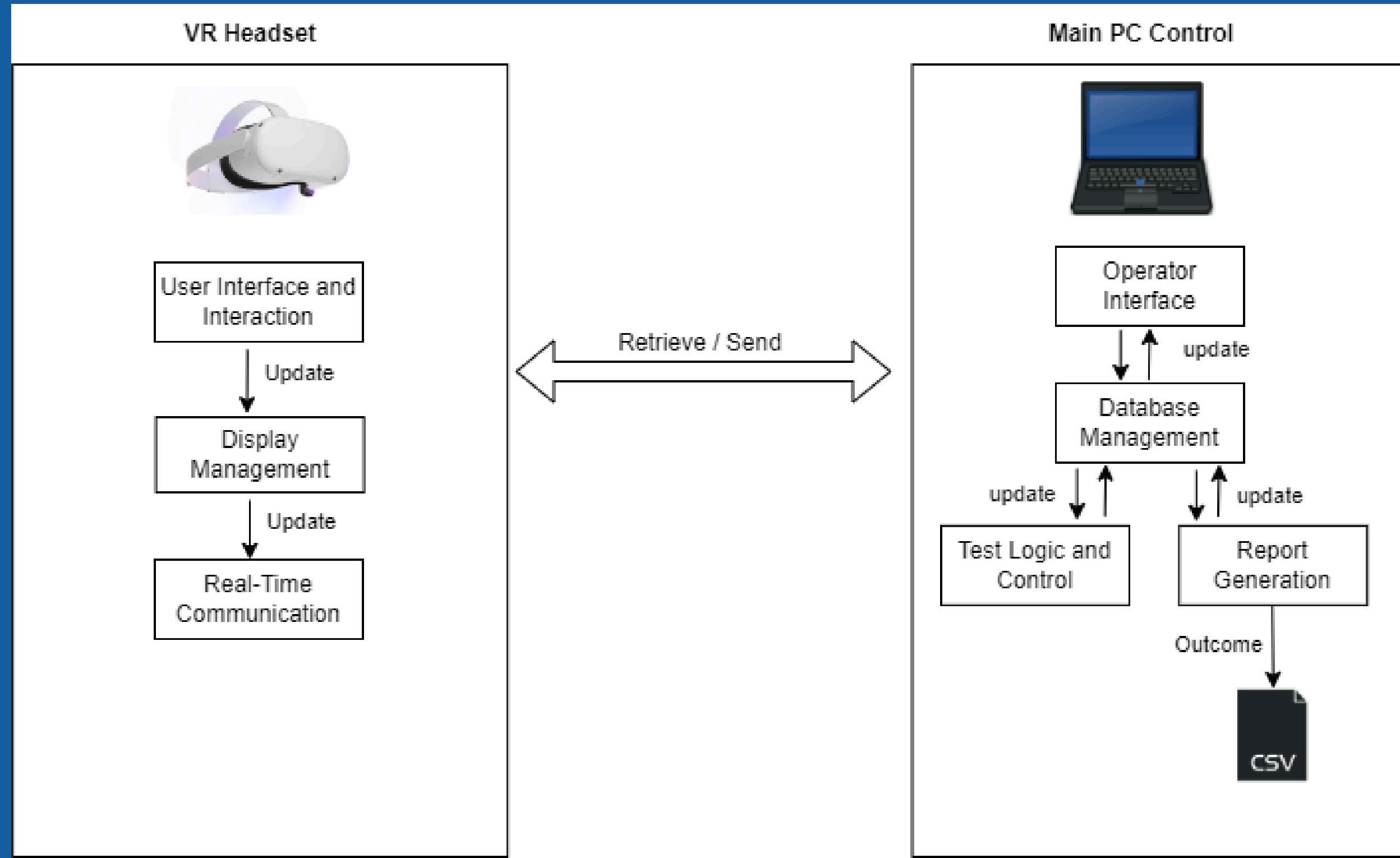




The Primary Functionalities



Product Architecture



System Evaluation - Future

- Ensures reliable assessments across different populations by including control groups.
- Evaluate system's sensitivity and specificity in distinguishing individuals with AD from those without.
- Present the system to Carmel Hospital.

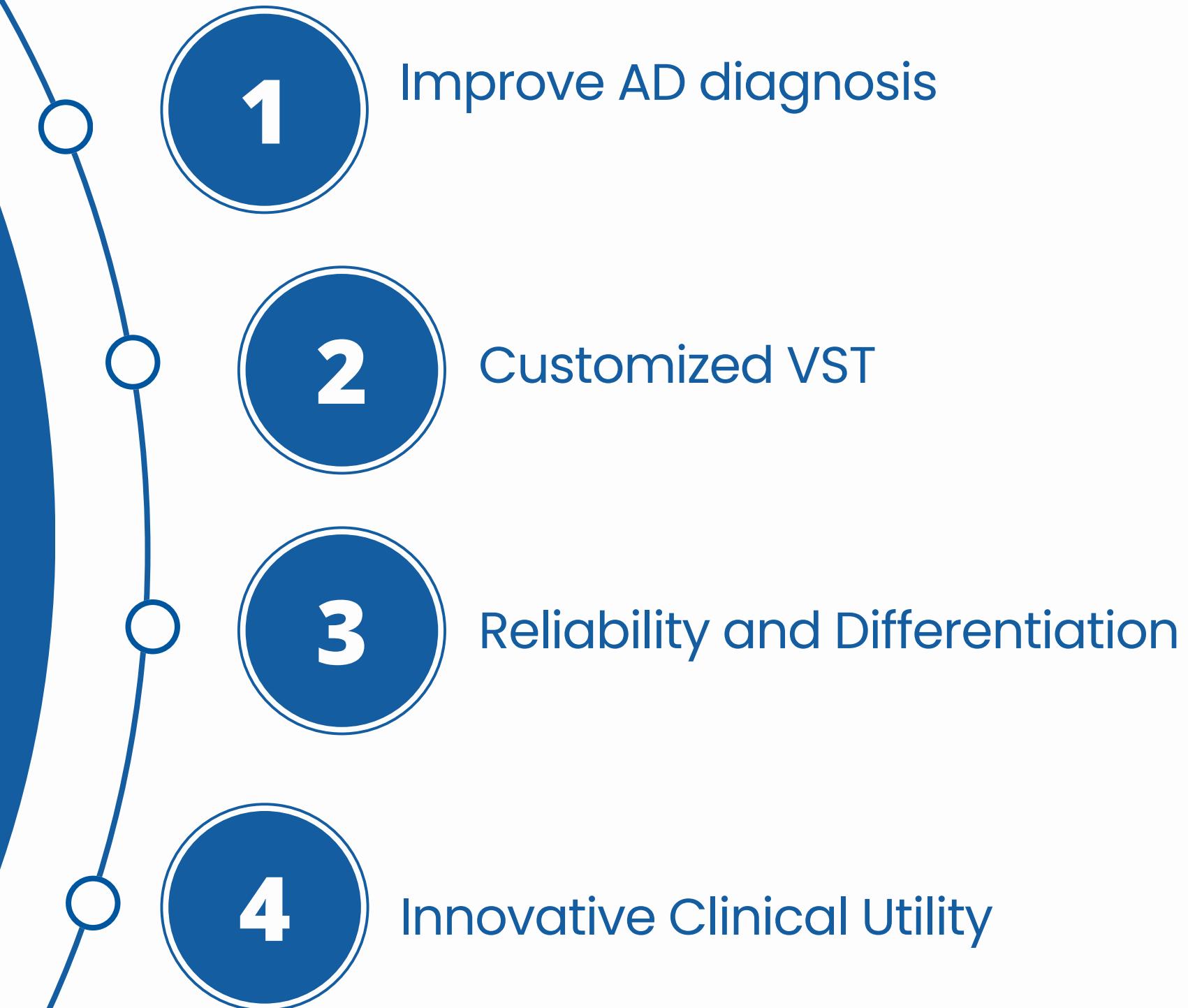
Challenges and Limitations



- Hardware Requirements.
- Comfort and Usability.
- Motion Sickness.
- Time limitation:
 - The time constraint specified by Dr. Spector
 - limited time frame of one semester allocated for system development.
- Data Privacy and Security.



Summary

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- 1 Improve AD diagnosis
 - 2 Customized VST
 - 3 Reliability and Differentiation
 - 4 Innovative Clinical Utility

Thank
you!