



Department of Computer Science

Healing Touch

Utilizing Touchscreen Technology in Medical Rehabilitation

Michael Fore, Jeffrey Newton, Sean Owen, Anh Pham,
Jeff Regan, Alex Welsh, and Matthew Williams

Advisor: Dr. Donnell Payne

Texas Health Resources Advisors: Dr. Malcolm Stewart, Mike Skupien



Motivation

- Rehabilitation exercises are often repetitive and boring
 - Games are stimulating and fun
 - Multi-touch devices are interactive and engaging
- Conventional rehabilitation software is often a barrier to patients
 - Touchscreen devices are intuitive
- Therapist's setup and record keeping is often manual
 - Automated profiles provide easy customization for patient testing
 - Computerized system provides automated collection, retrieval and reporting

Goals

- Explore the potential of multi-touch devices in medical rehabilitation
- Create an array of games that focus on different areas of physical and mental testing
- Design a framework that provides for the future addition of games
- Provide for streamlined data collection of the patient's game outcomes
- Allow reporting of game results for patient monitoring and comparison purposes

Components

Microsoft Surface

- Windows Vista based
- IR based touchscreen - 50+ simultaneous touches
- Multi-touch gaming platform



Apple iPad

- iOS 4.3.1
- Capacitance based touchscreen - 11 touch points
- Multi-touch gaming platform



Database

- Microsoft SQL Server 2008 R2

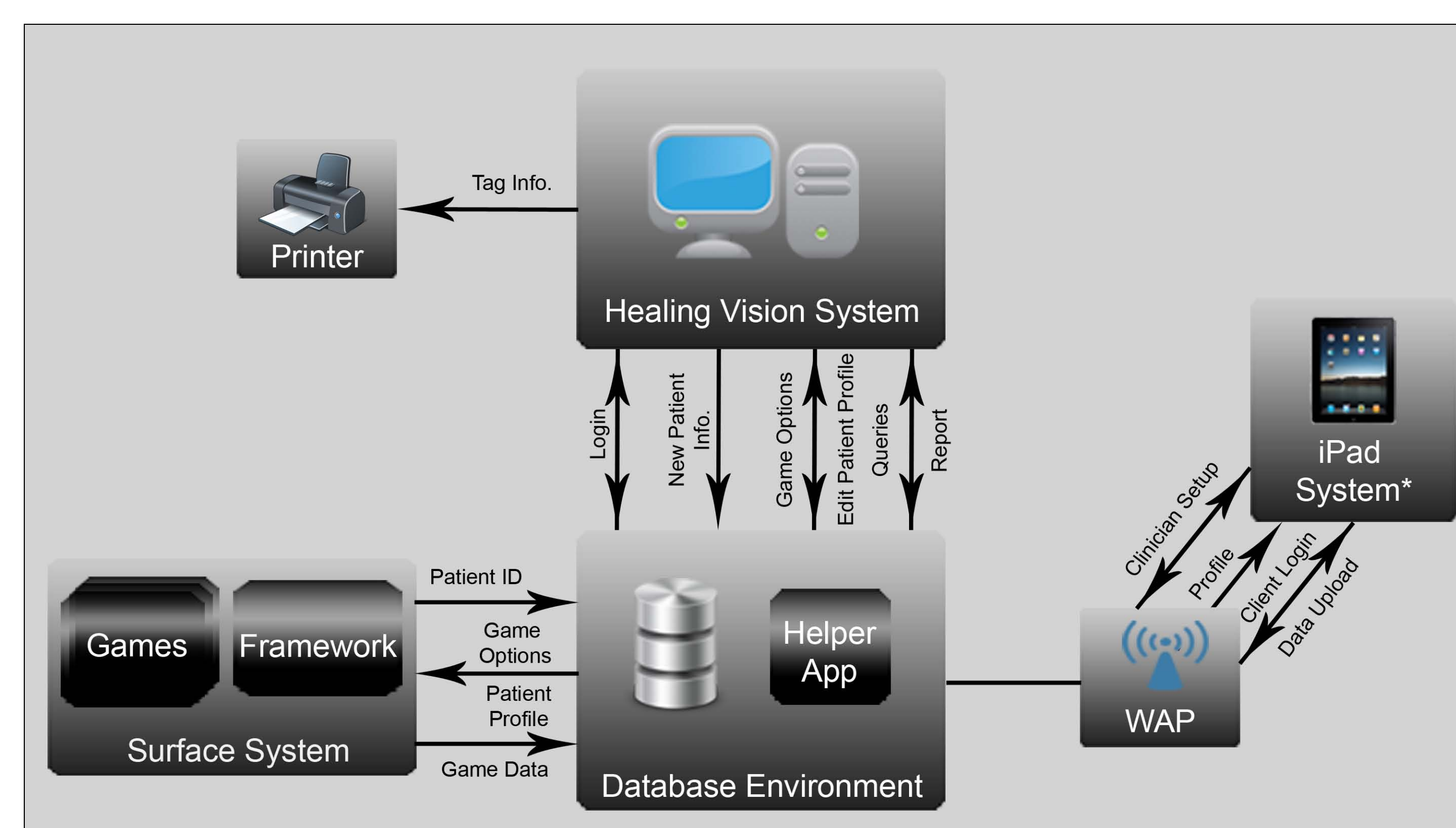
Workstation Application – Healing Vision

- Database interface running on a Windows 7 based machine
- Ability to add and edit patients and clinicians, modify patient game options, generate reports and queries, and print reports and queries

Network

- Surface and Healing Vision workstation connected to database server through a wired connection
- iPad connected to database server through a wireless access point encrypted with WPA2 enterprise

System Architecture



Applications

- Upper extremity rehabilitation therapy
- Diagnostic profile for stroke, head trauma, Alzheimer's, and Parkinson's patients
- Memory and visual spatial testing
- Repeated measures to evaluate therapy
- Longitudinal population studies
- Early detection of neurodegenerative disorders

Results and Conclusions

- Successfully implemented a suite of games that allows for rehabilitation and testing of various medical conditions
- Successfully implemented a framework that provides for the future addition of games
- Successfully automated collection and reporting of game results
- Healing Touch represents a successful project working with an external client
- Healing Touch demonstrates the untapped potential of touchscreen technology in medical rehabilitation

Acknowledgments

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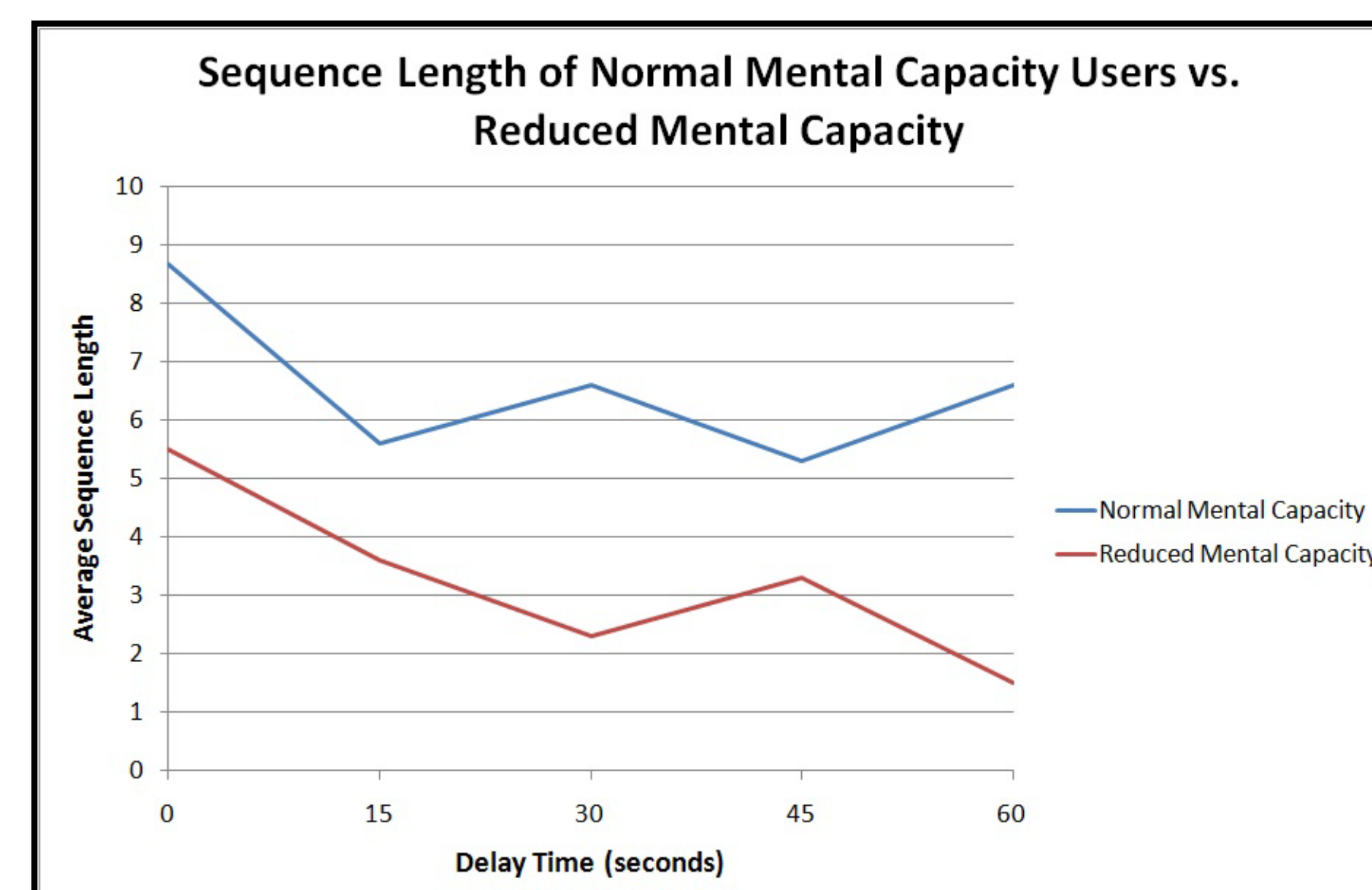
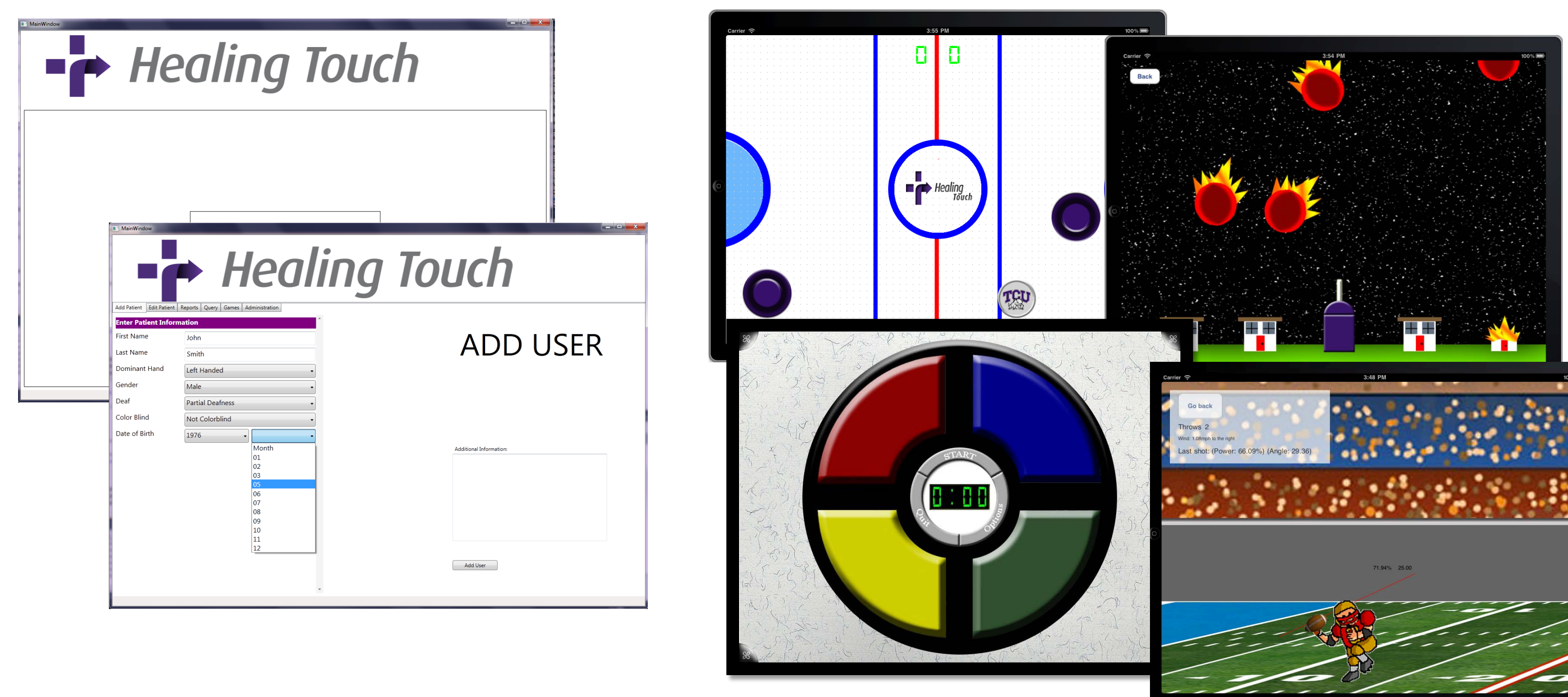
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This graph represents a population study using data collected by the Healing Touch system. The following process was used:

- Volunteer testers of both normal and reduced mental capacity were asked to play 5 games of 'Froggie Says' for each delay time of 0, 15, 30, 45, and 60 seconds.

- Data from each group was averaged for each delay time and used to generate a line chart.

This illustrates the ability of Healing Touch to be used as a data collection and reporting tool.