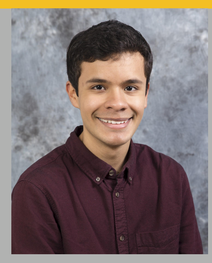
Kinect Physical Therapy

A solution to help and monitor patients with remote physical therapy exercises.



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PROBLEM:

- Physically disabled Parkinson's Disease patients require in-person physical therapy
- Physical therapy is expensive and requires time and travel to achieve good results
- Not all patients have the resources and access to good healthcare
- Inaccessibility to physical therapy can impede progress and allow developments in physical health issues to go unnoticed

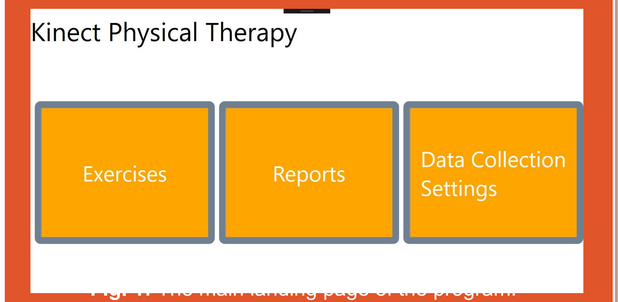

Fig. 1: The main landing page of the program. Users have access to picking an exercise or viewing generated reports about their sessions.

SOLUTION:

- Alternative to in-person physical therapy
- Telehealth applications for patient therapy and exercise
- In-home physical exercises using a body tracking sensor
- Body data is collected anonymously and exported to a CSV file
- Data is then shared with patient's physical therapist
- Progress is monitored through automatic report generation

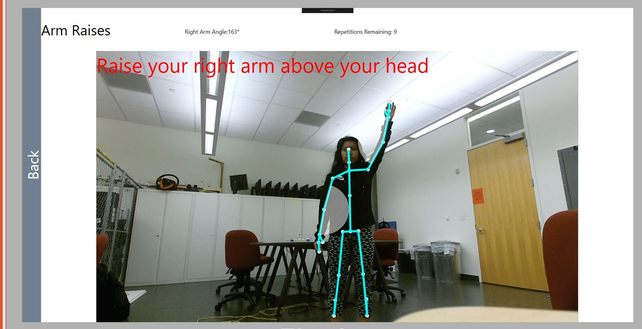

Fig. 2

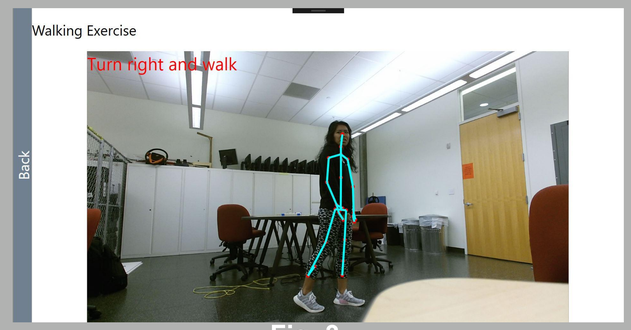

Fig. 3

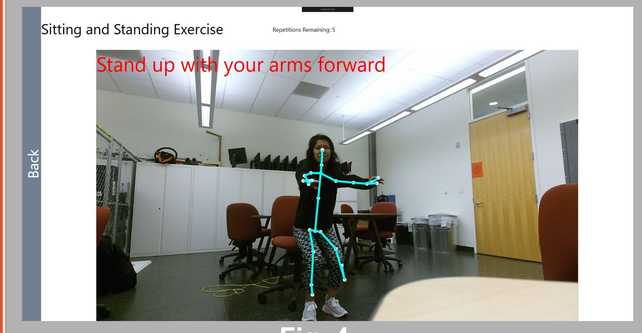

Fig. 4

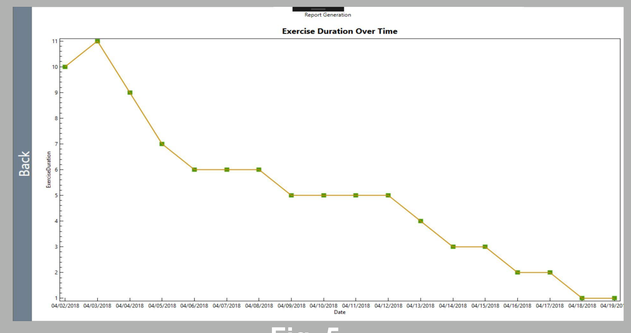

Fig. 5

Fig. 2-4

- User's skeleton is overlaid using node data
- Instructions guide you through the exercise
- Angles of interest are highlighted
- Counter tells you how many repetitions you have left to complete

Fig. 5

- User statistics are collected
- Report is generated automatically
- Track user progress over time

CONCLUSIONS

- We have developed a usable solution that allows users to perform physical therapy exercises at home
- The application was designed for Parkinson's Disease patients and was designed for ease of use for this target demographic
- Data collection contributes towards research in machine learning for potential health monitoring applications
- This product can be made more useful by adding a physical therapist view that allows access to patient data and therapists to prescribe exercises to patients, further contributing to the advancement of Telehealth

RESULTS:

We have developed an application that allows users to perform physical therapy exercises at home using a Microsoft Kinect v2 Sensor. The minimal, easy-to-use interface can be navigated intuitively using hand gestures.

Exercises

- Users can select the exercise they want to do, and the on-screen instructions will guide them through it
- Users can customize the number of repetitions they do for each exercise
- As users complete the exercise, the application uses gesture recognition to determine how many repetitions they have completed

Data Collection

- Using the body tracking capabilities of the Kinect sensor, the application collects the user's node data as they complete the exercises
- The raw node data is exported to a CSV file and can then be sent to a physical therapist or researcher for analysis

Report Generation

- Various statistics on the user's performance in the exercises are collected and displayed
- The visualization displays these statistics over time to allow users and physical therapists to easily see progress over time

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