An objective assessment tool for evaluating functioning in older adults.

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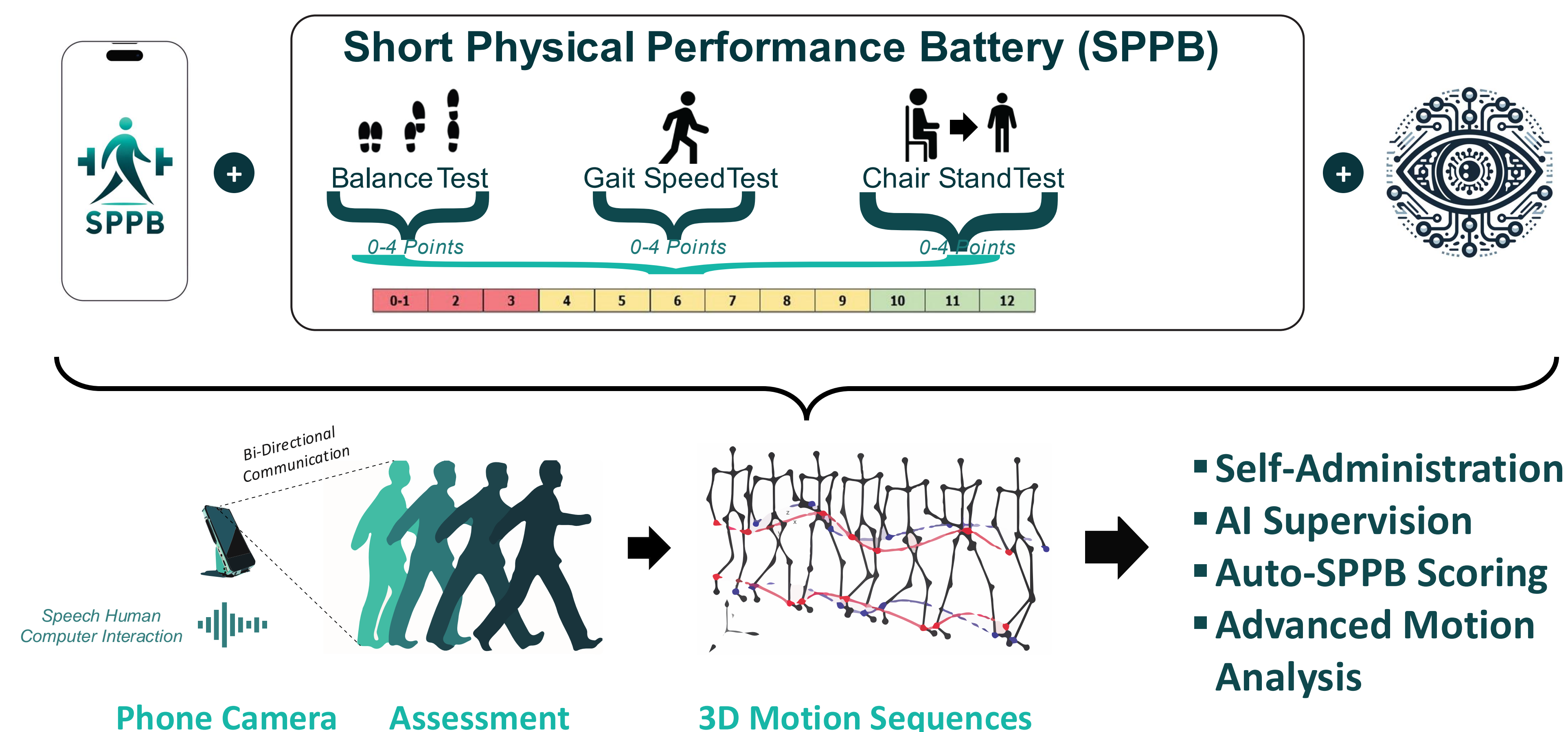Stanford University
MassAITC AD/ADRD Pilot Core

MOTIVATION

- **Assessing physical** function is crucial for detecting **health risks** in **older adults.**
- Impaired function predicts **falls, frailty, hospitalizations, all-cause mortality**, and may serve as an **early indicator** of **neurodegeneration.**
- The Short Physical Performance Battery (**SPPB**), developed by the **NIA**, is a widely used **standardized assessment** of **physical function.**
- Currently such **assessments** are being done **irregularly** in the **clinic.**
- A **self-administered, smartphone-based** remote SPPB could enable **frequent, more detailed** evaluations, even in **low-resource** settings.
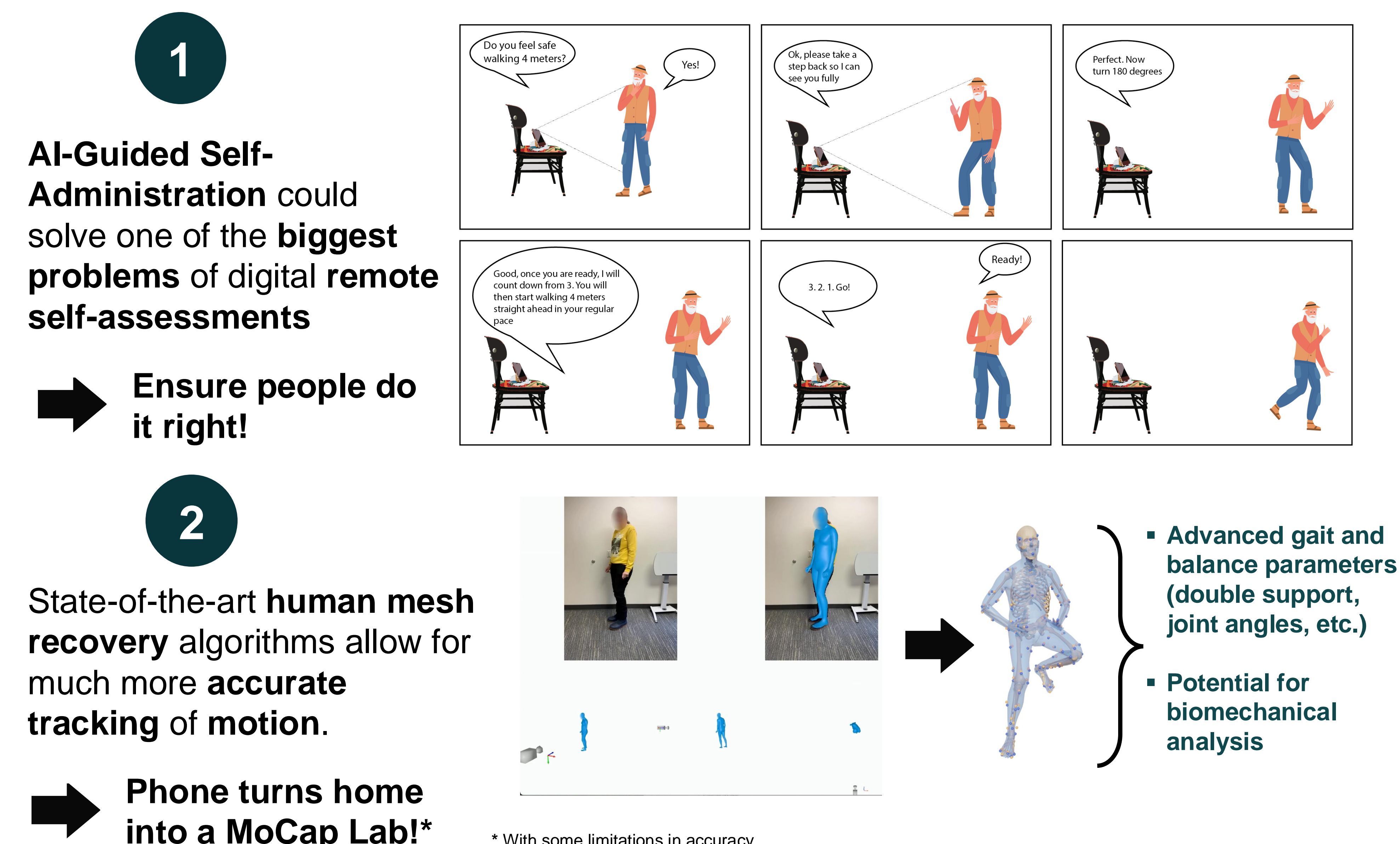
OBJECTIVES

I. **Design** and **develop smartphone-based** SPPB that can be **self-administered** using **computer vision** and LLM based **speech interface**.

II. **Build AI models to** automatically score **SPPB tasks**

III. **Collect** data in **older adults with** and **without ADRD** and evaluate **feasibility** to **screen** for **neurodegeneration**

APPROACH

Short Physical Performance Battery (SPPB)

Balance Test · Gait Speed Test · Chair Stand Test

- Self-Administration
- AI Supervision
- Auto-SPPB Scoring
- Advanced Motion Analysis

Phone Camera · Assessment · 3D Motion Sequences

KEY INNOVATIONS

1 **AI-Guided Self-Administration** could solve one of the **biggest problems** of digital **remote self-assessments**

➤ Ensure people do it right!

2 State-of-the-art **human mesh recovery** algorithms allow for much more **accurate tracking** of **motion**.

➤ Phone turns home into a MoCap Lab!*

- Advanced gait and balance parameters (double support, joint angles, etc.)
- Potential for biomechanical analysis
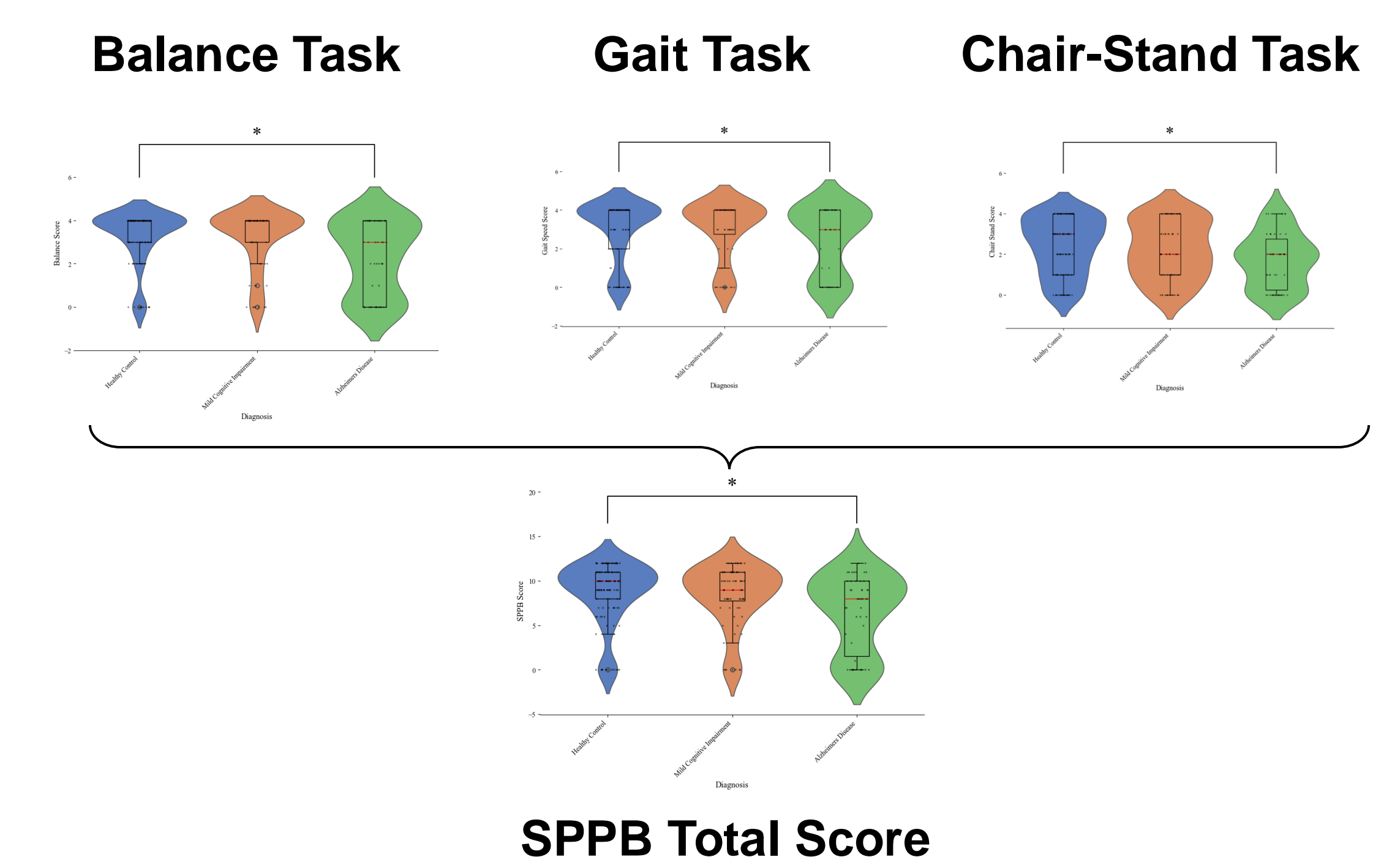
* With some limitations in accuracy.

RESULTS/CHALLANGES

- **Scope too broad**, we started **focusing** on just **gait-sub task**
- Human computer interaction (HCI) part is **harder** than anticipated, we are **currently running UX interviews** in cooperation with HCI experts
- **Safety** concerns, **what is safe for who**?
- Implemented prototypes of **scoring** and SOTA **human mesh recovery** algorithms based on (**N=100+**) older adults performing the gait sub-task.
- **Started collecting** full SPPB data in cooperation with **Stanford ADRC** (**N=11** patients recorded)
- **Early evidence** shows **SPPB** scores alone exhibit **statistically significant** differences between **healthy** and diagnosed **AD** (**N=176**)

Balance Task · Gait Task · Chair-Stand Task

SPPB Total Score

ACKNOWLEDGEMENT