Motor Function Assessment for Mild Cognitive Impairment, Frailty, and Fall Risk

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PennAITech AD/ADRD Focus Pilot Core

Motivation

- Mild Cognitive Impairment (MCI), falls, and frailty are prevalent in older adults
- MCI is the first clinical diagnosis in the Alzheimer's disease continuum, early intervention is essential for treatment
- Only **8%** of older Americans expected to have MCI **receive a clinical diagnosis**[1]
- A phenotypic marker shared by MCI, falls, and frailty is a decline in motor function
- Our preliminary work used AI and motor function assessments to identify persons with MCI with 83% accuracy[2]
- **Our goal is to further develop a portable and affordable motor function assessment platform with AI to discriminate MCI, fall risk, and frailty**

Objectives

- Data collection, n = 80 (Table 1)
  - 30 older adults with MCI
  - 50 healthy older adults
- Use AI to identify
  - Mild Cognitive Impairment
  - Fall Risk
  - Physical Frailty
- Develop clinically usable outputs

Mizzou Point-of-care Assessment System MPASS

Motor Function Assessments

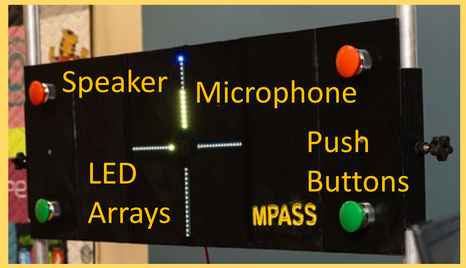
Static Balance

Walking

Sit to Stand

Reaction Time

MPASS Instrumentation



MPASS Workflow

Table 1: Data Collection

MPASS Motor Function Tests	Cognitive	Frailty	Fall History	Demographics
Static Balance Eyes Closed*, Walking*, 5 Times Sit-to-Stand*, Step Down*, Reaction Time *Single task and dual task (Serial 7's)	MoCA, RBANS	Frail Scale, Tilburg Frailty Indicator	# of falls in last year	age, height, weight, sex, race, income, education, activity, marital status, family history

Status

- Data Collection is 75% complete as of March 12
  - Expected completion of all 80 participants in April
- We have started development of AI prediction algorithms
  - Decision Trees, Random Forest, Support Vector Machine, XGBoost, and Bayesian networks
- We are also investigating how deep learning based on Transformers can be used for improved prediction

References

1 Liu et al. 2024 Detection rates of mild cognitive impairment in primary care for the United States Medicare population. J Prev Alz Dis. 2024;1(11):7-12.
2 Hall JB, et al. 2024 Feasibility of Using a Novel, Multimodal Motor Function Assessment Platform With Machine Learning to Identify Individuals With Mild Cognitive Impairment. Alzheimer Dis Assoc Disord. 2024;38(4):344-50

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