Non-Invasive Assessment of Stomach Fullness Using Electrical Impedance Tomography
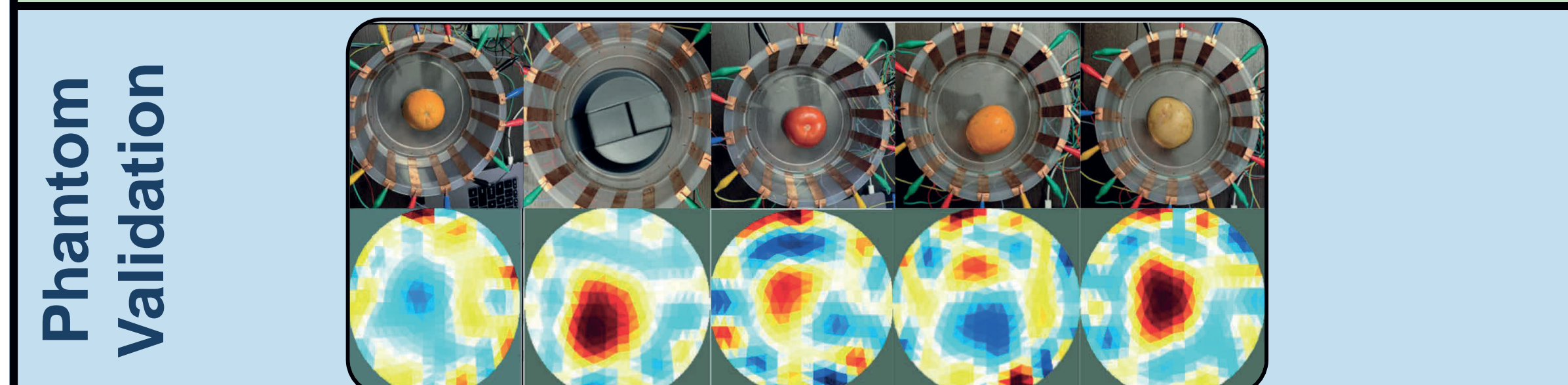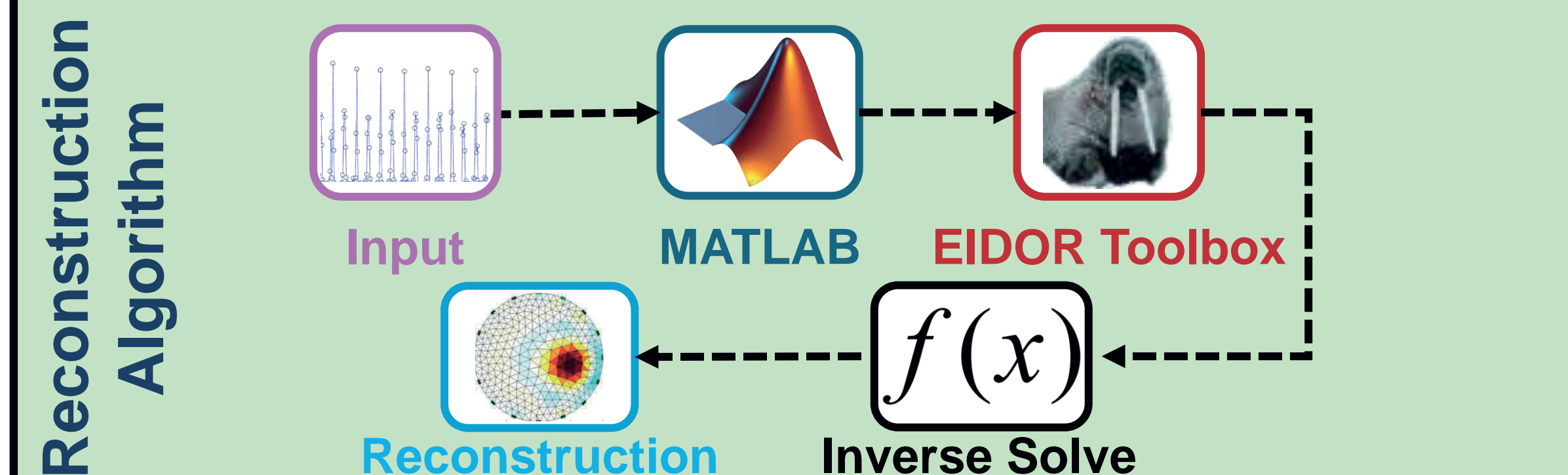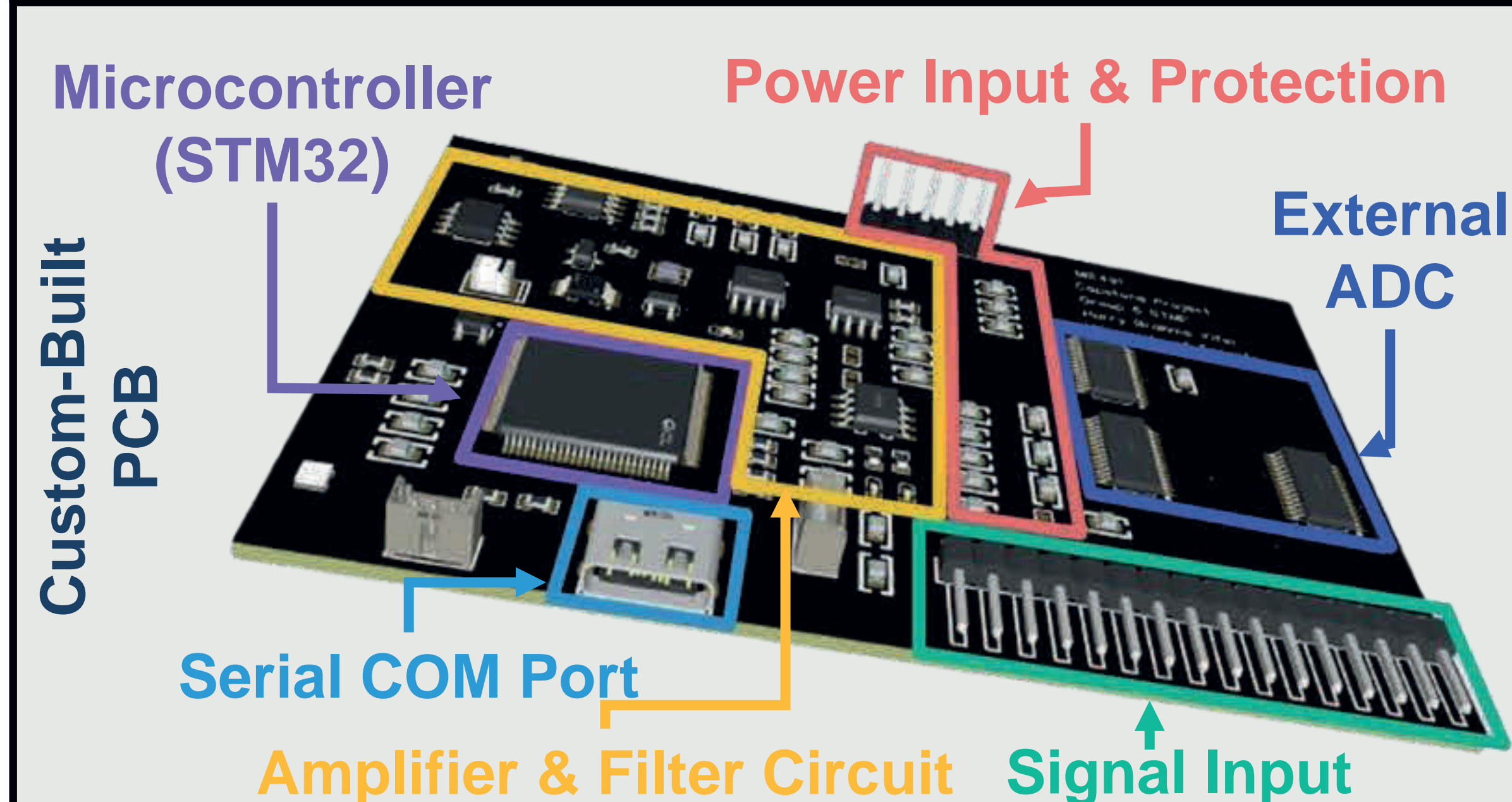
Team: Harry Guan[1], Brahms Krever[1], Yifei Wu[1] **Supervisor:** Nasser Ashgriz[1]

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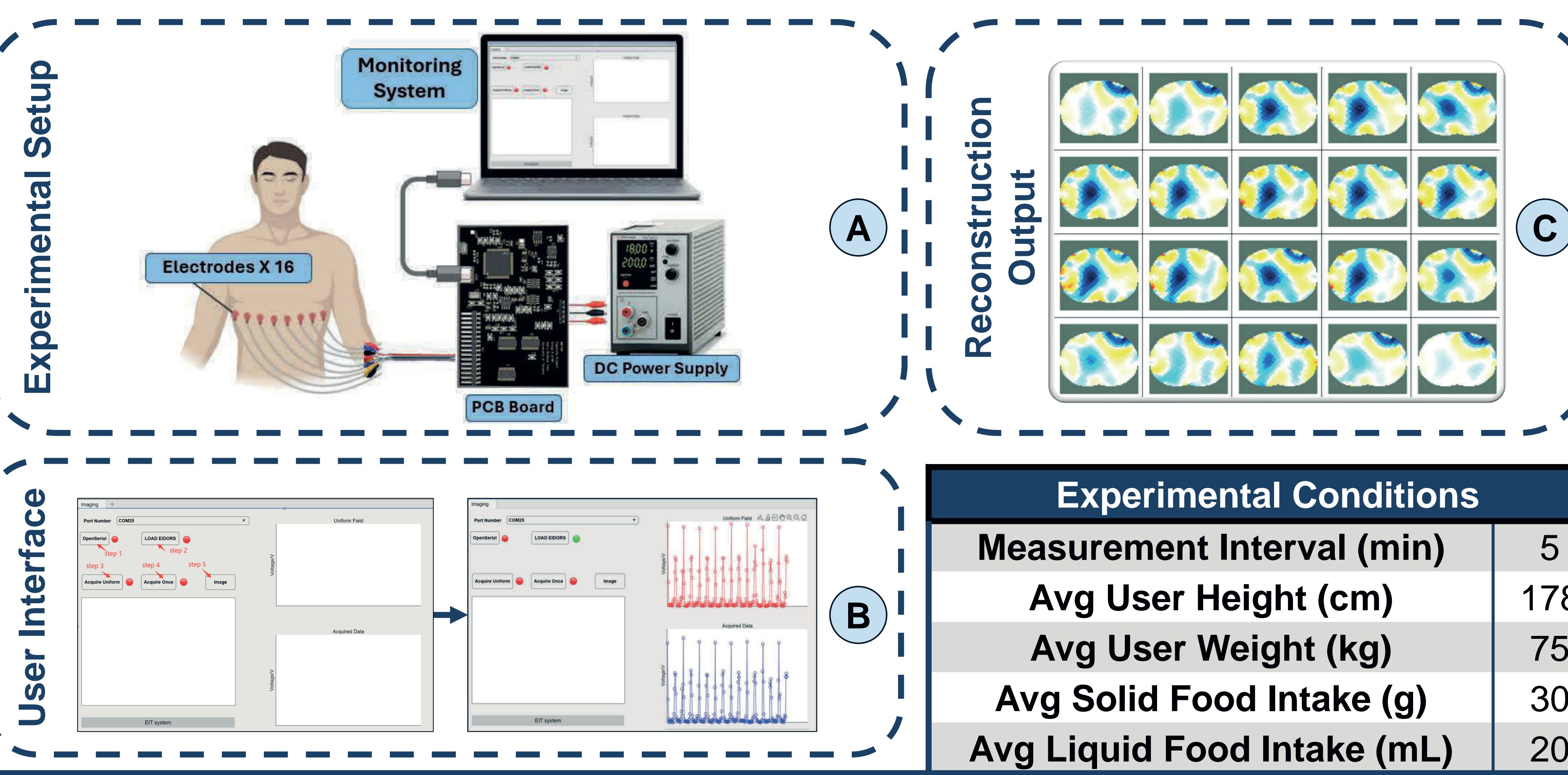UNIVERSITY OF TORONTO

DEFY GRAVITY

1. Addressing Lag in Satiety

1. **Problem**: Overeating is a contributor to obesity.
2. **Solution**: Develop a low-cost, real-time stomach fullness monitoring device.
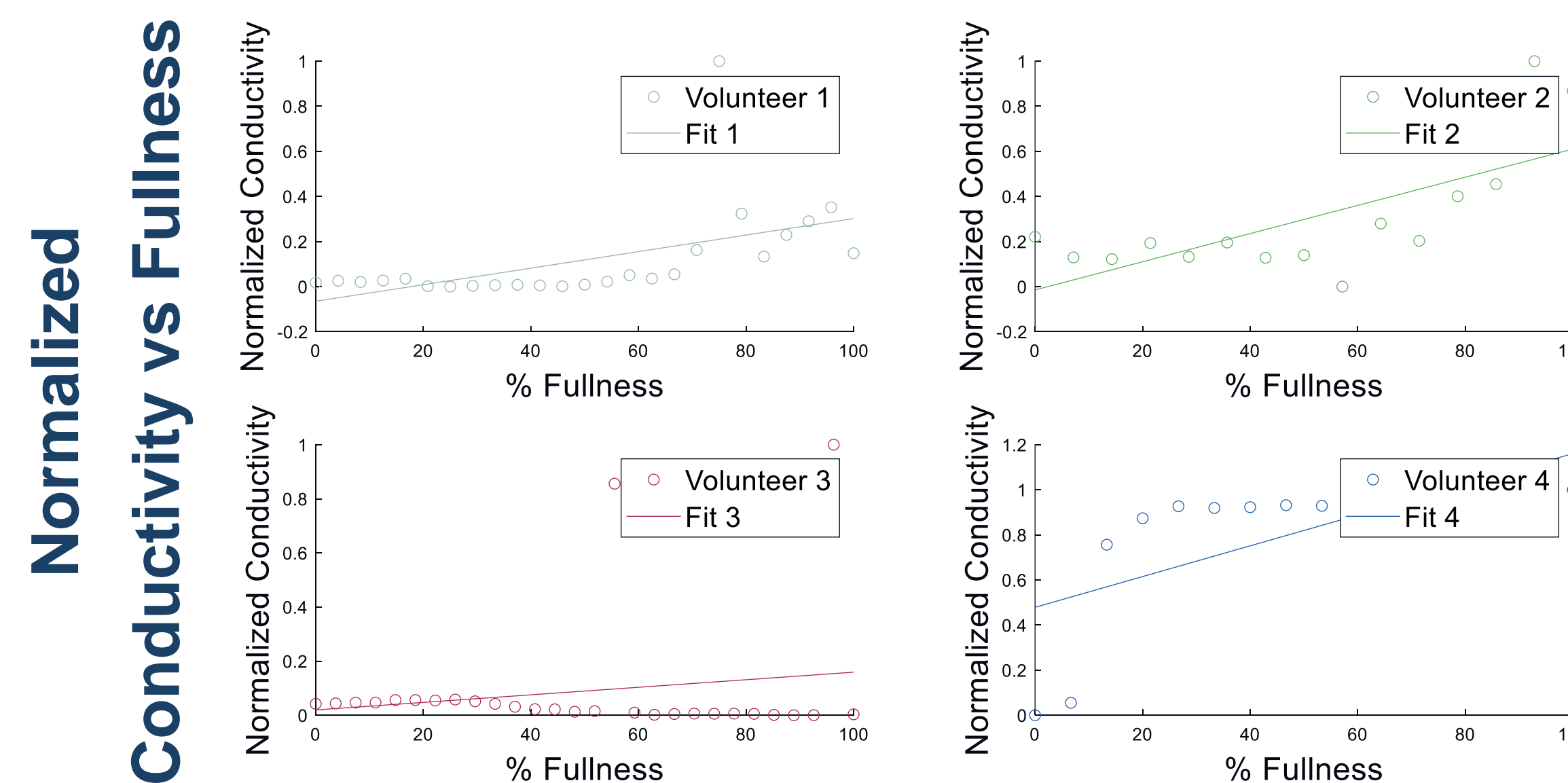3. **Goal**: Determine the relationship between stomach fullness and electrical conductivity.

2. Design Process Overview

Custom-Built PCB

- Microcontroller (STM32)
- Power Input & Protection
- External ADC
- Serial COM Port
- Amplifier & Filter Circuit
- Signal Input

Reconstruction Algorithm

Input → MATLAB → EIDOR Toolbox → $f(x)$ Inverse Solve → Reconstruction

Phantom Validation

3. A Low-Cost, Real-Time, Non-Invasive Solution

Experimental Setup

- Monitoring System
- Electrodes X 16
- PCB Board
- DC Power Supply

(A)

Reconstruction Output

(C)

User Interface

(B)

Experimental Conditions

Measurement Interval (min)	5
Avg User Height (cm)	178
Avg User Weight (kg)	75
Avg Solid Food Intake (g)	30
Avg Liquid Food Intake (mL)	20

4. Fullness Correlation

Normalized Conductivity vs Fullness

5. Summary & Future Work

Summary: Developed real-time stomach monitoring via EIT with a 16-electrode STM32 system and MATLAB GUI. Safety tested, cost-effective, and compliant.

Future Work: Improve on hardware, algorithms, and user adaptability.

Acknowledgments

References