



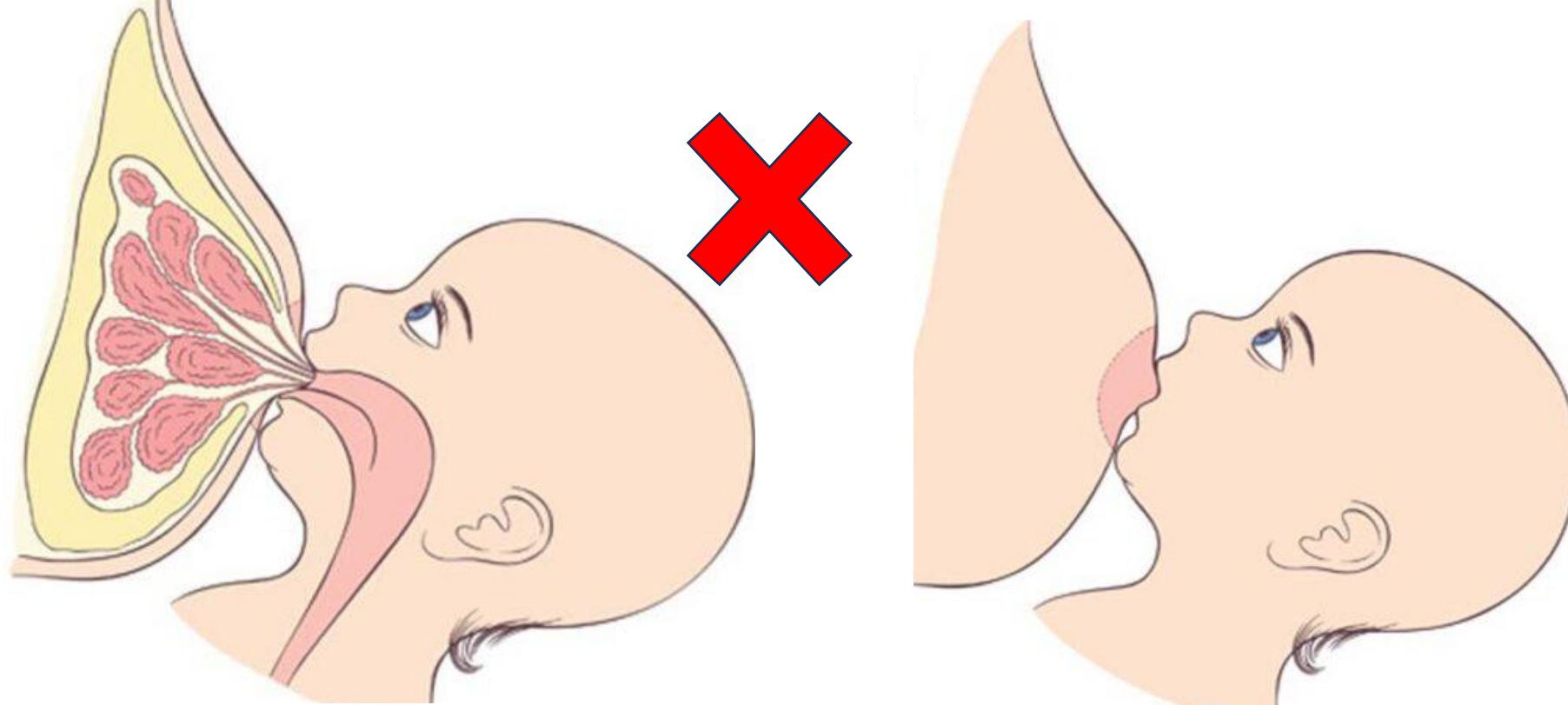
# PaciForce

## Quantifying Infant Latch Dynamics through Force Sensors

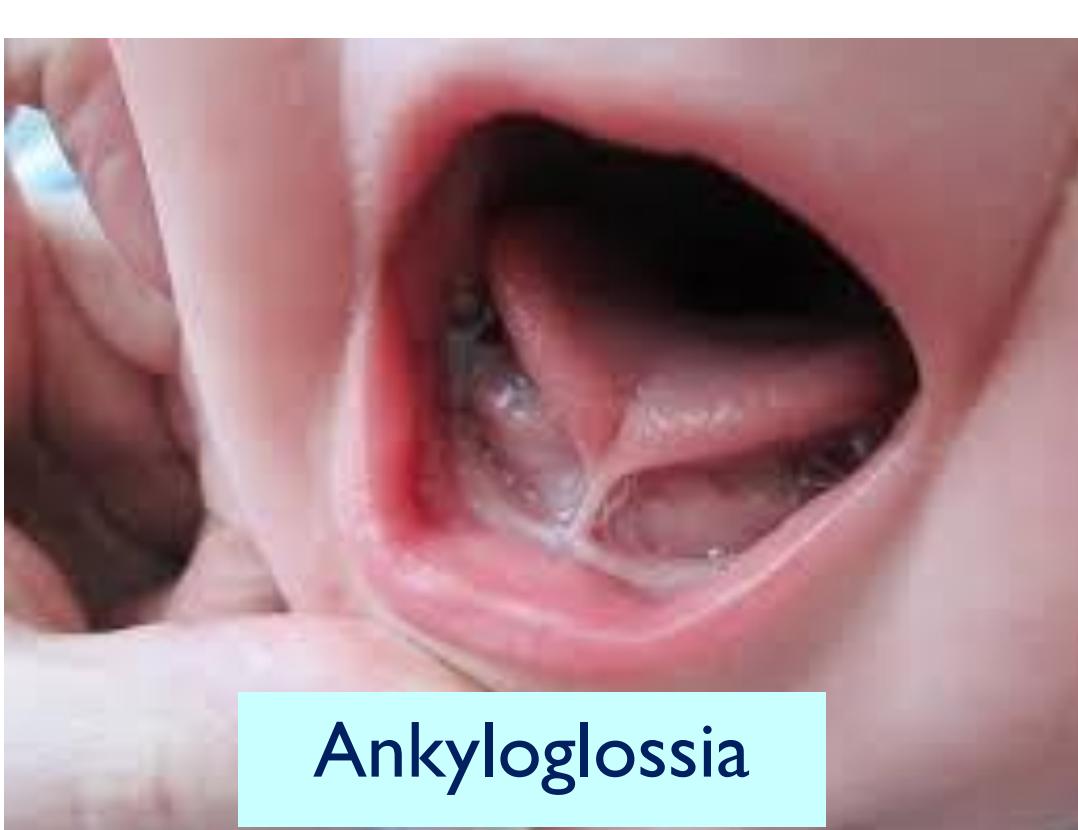
Nagarjun Bhat, Agrim Gupta, Shayaun Bashar, Dinesh Bharadia, James Friend, Erin Walsh

### The Problem

Inconsistent and shallow latch in newborns



- Painful experience for mothers
- Insufficient nutrition for infants.



Breastfeeding Cessation  
Infant Growth Deficits

### Current Solution

- Gloved Finger Test for latch



Subjective assessment from clinicians.  
Need for repeated appointments.  
Expensive/uncertain surgical interventions.



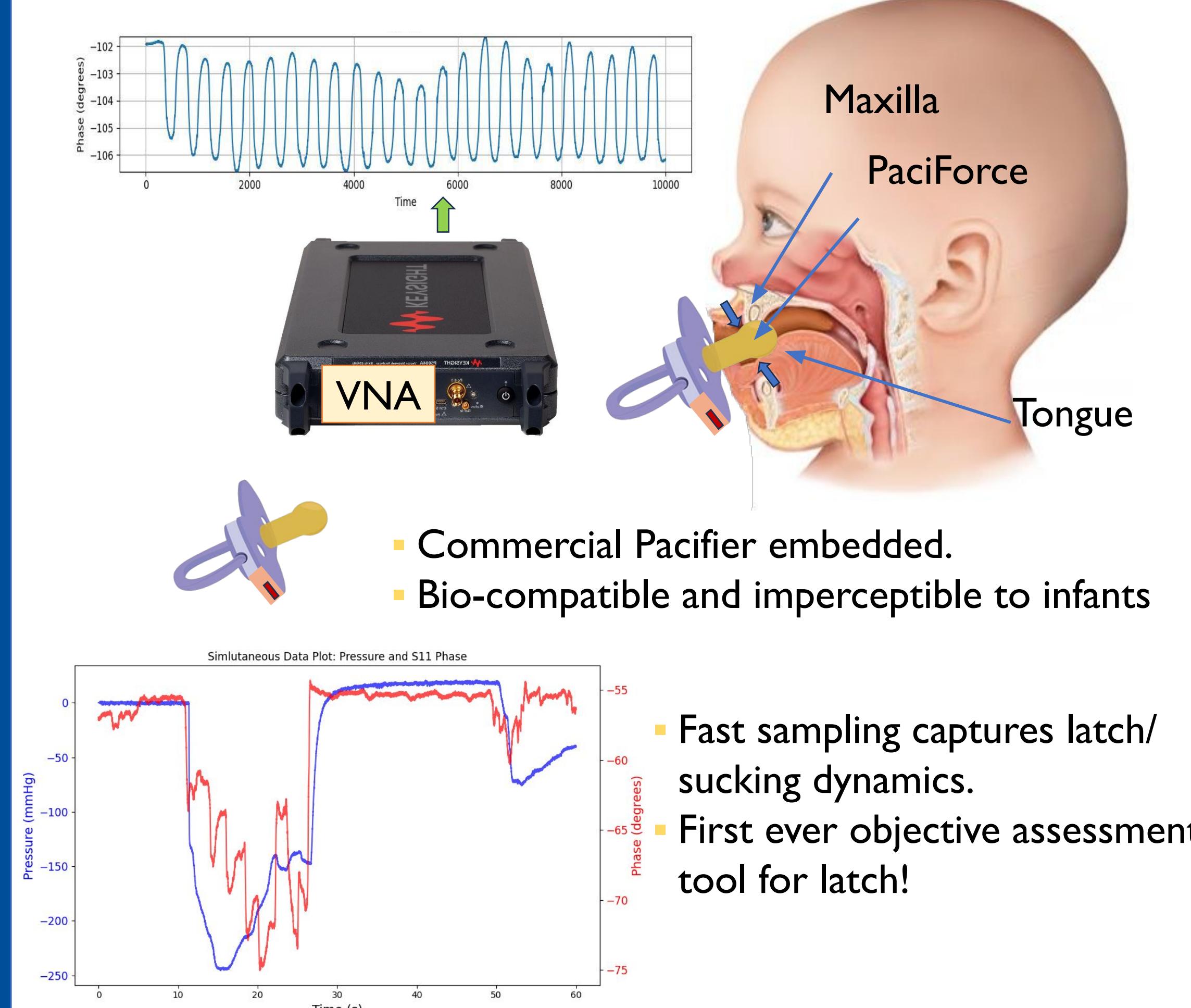
Binary Result: Baby fed/ not Fed?  
No diagnosis of underlying problem.

### Results

- PaciForce :**
- Achieves  $>1.2^\circ/\text{N}$  sensitivity in ultra-low force regime.
- Precise quantification of infant-breast latch by measuring compressive force.
- Can measure irregular rhythms in infant feeding action.
- Biocompatible, pacifier conformant, inexpensive.
- Imperceptible to infant
- No complex circuitry involved

### PaciForce

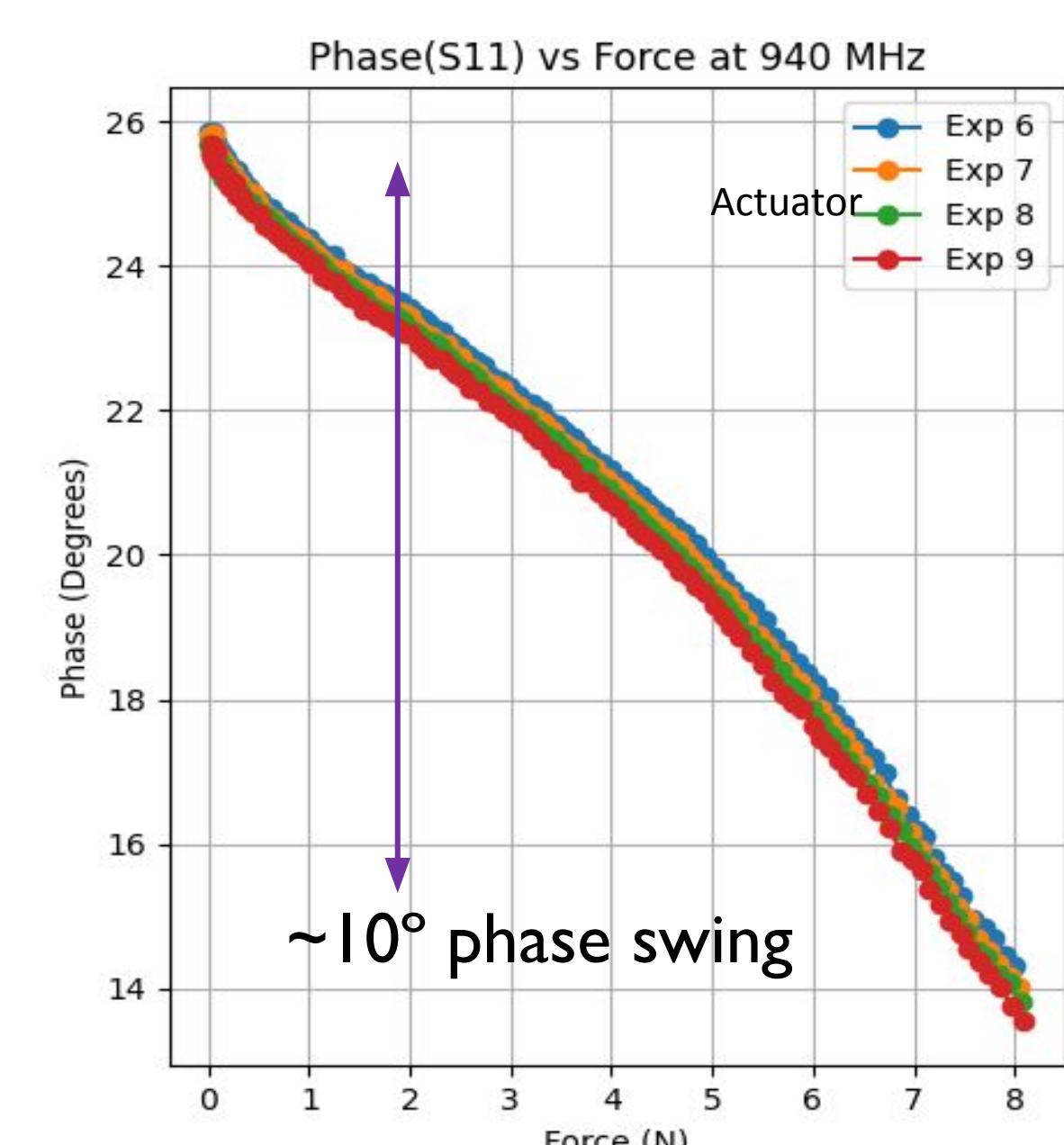
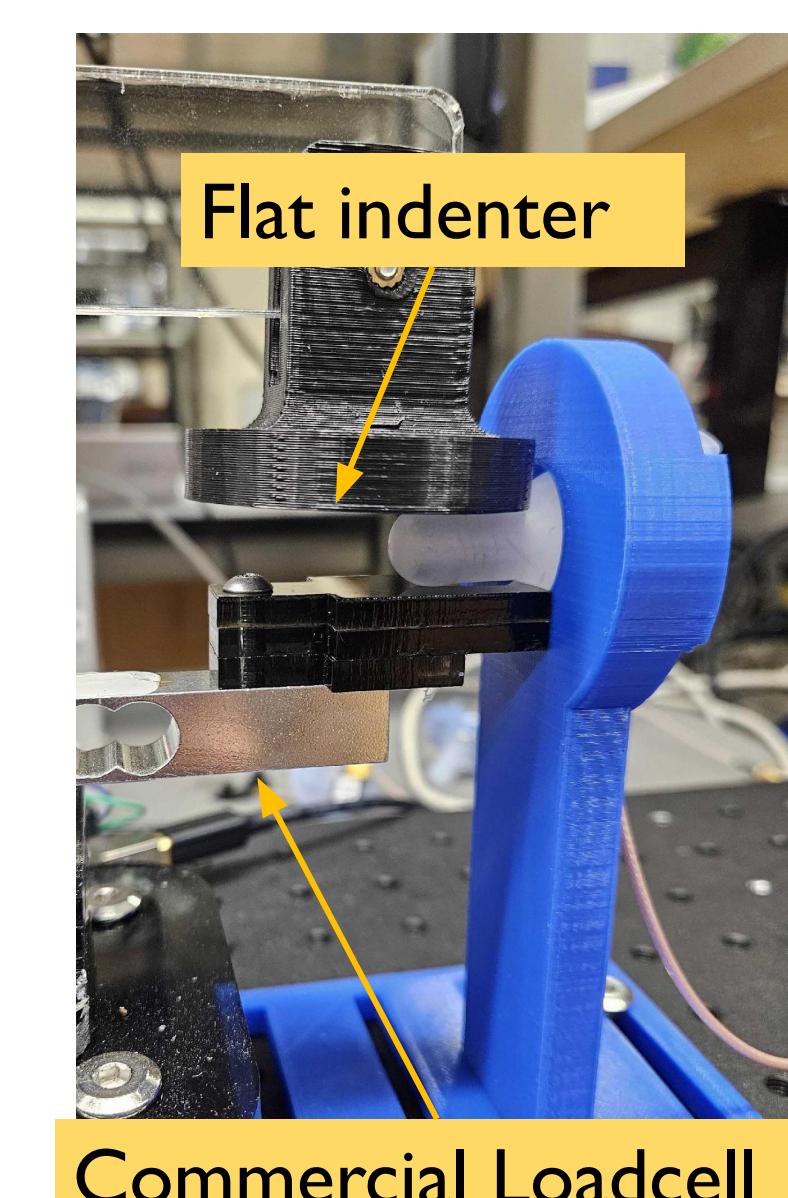
Embedded Sensors Quantifies Latch Efficacy



Pacifier embedded force sensor detects irregular rhythm + insufficient compressive force

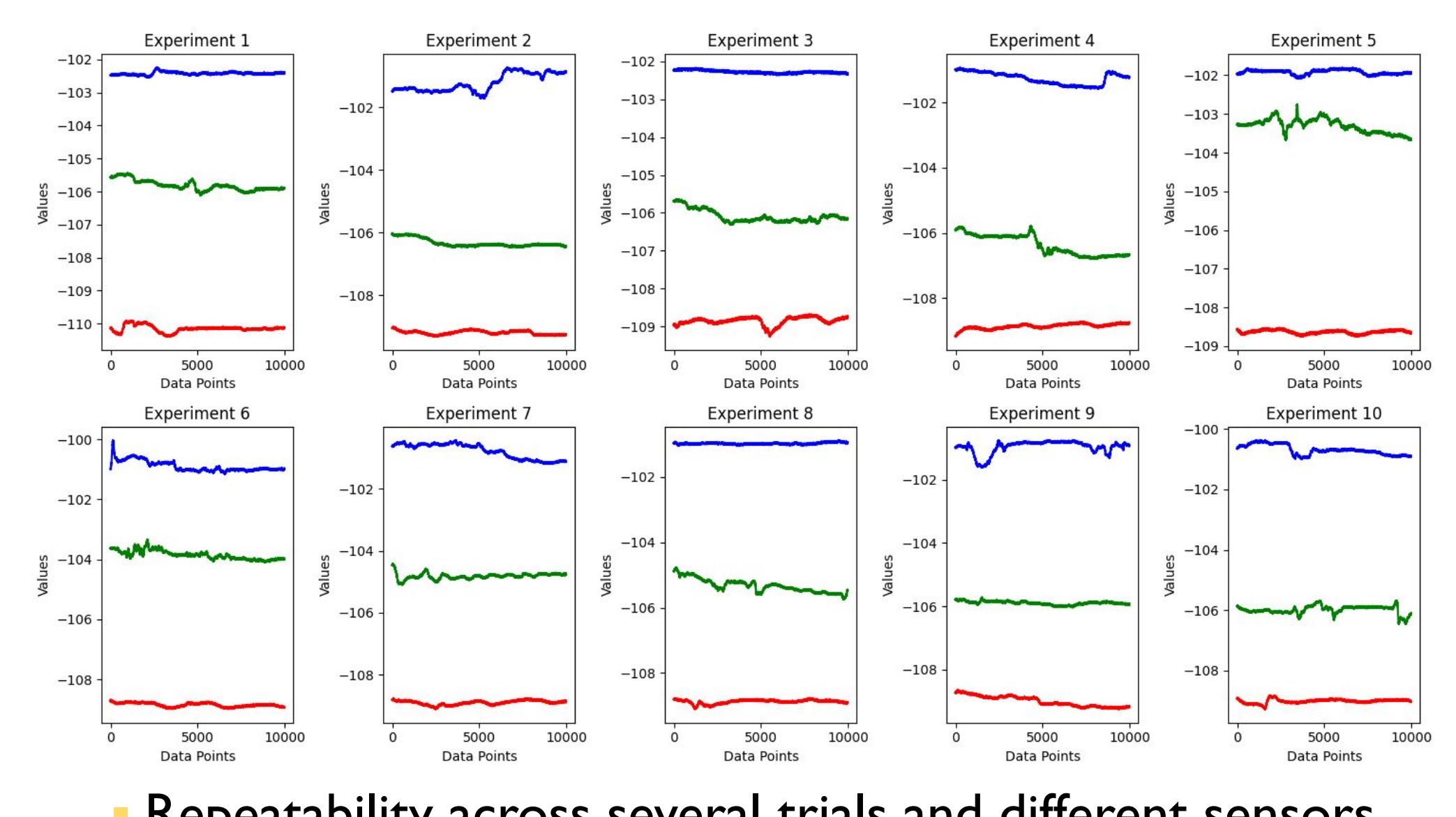
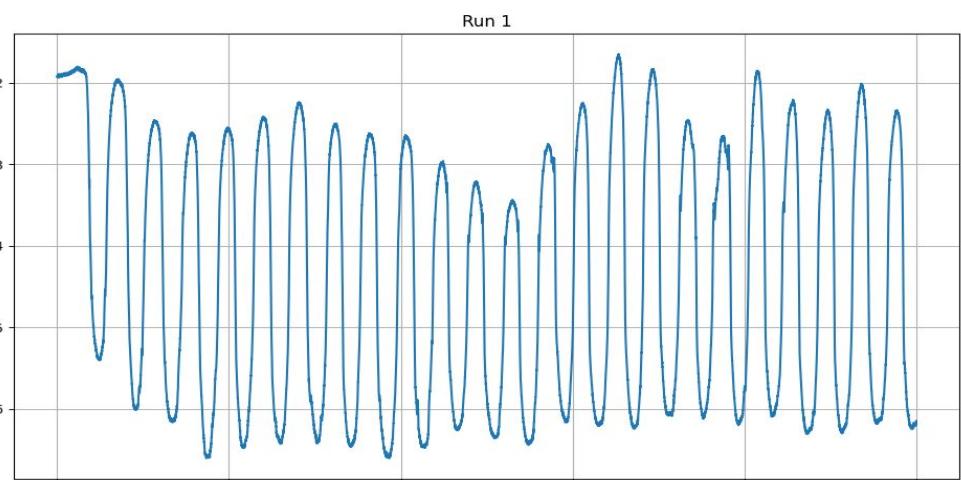
### Evaluation Results

Lab Evaluation with Actuator

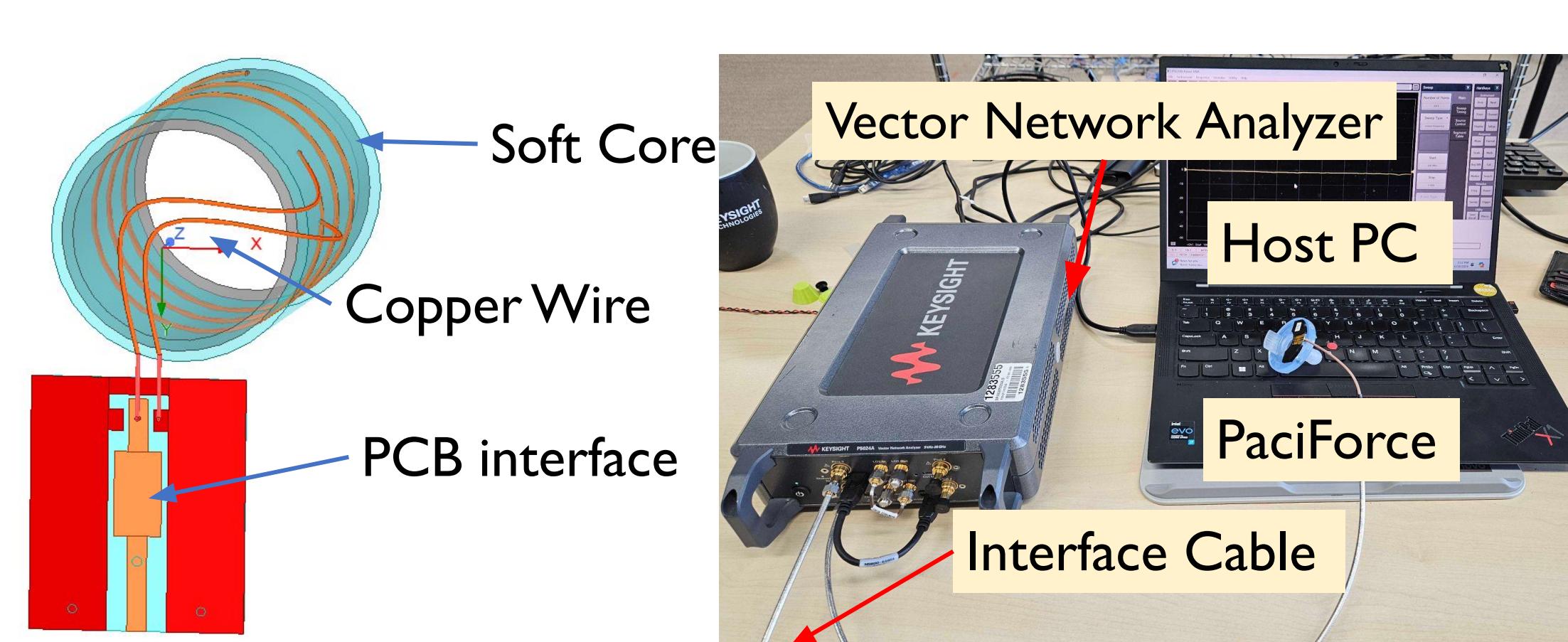
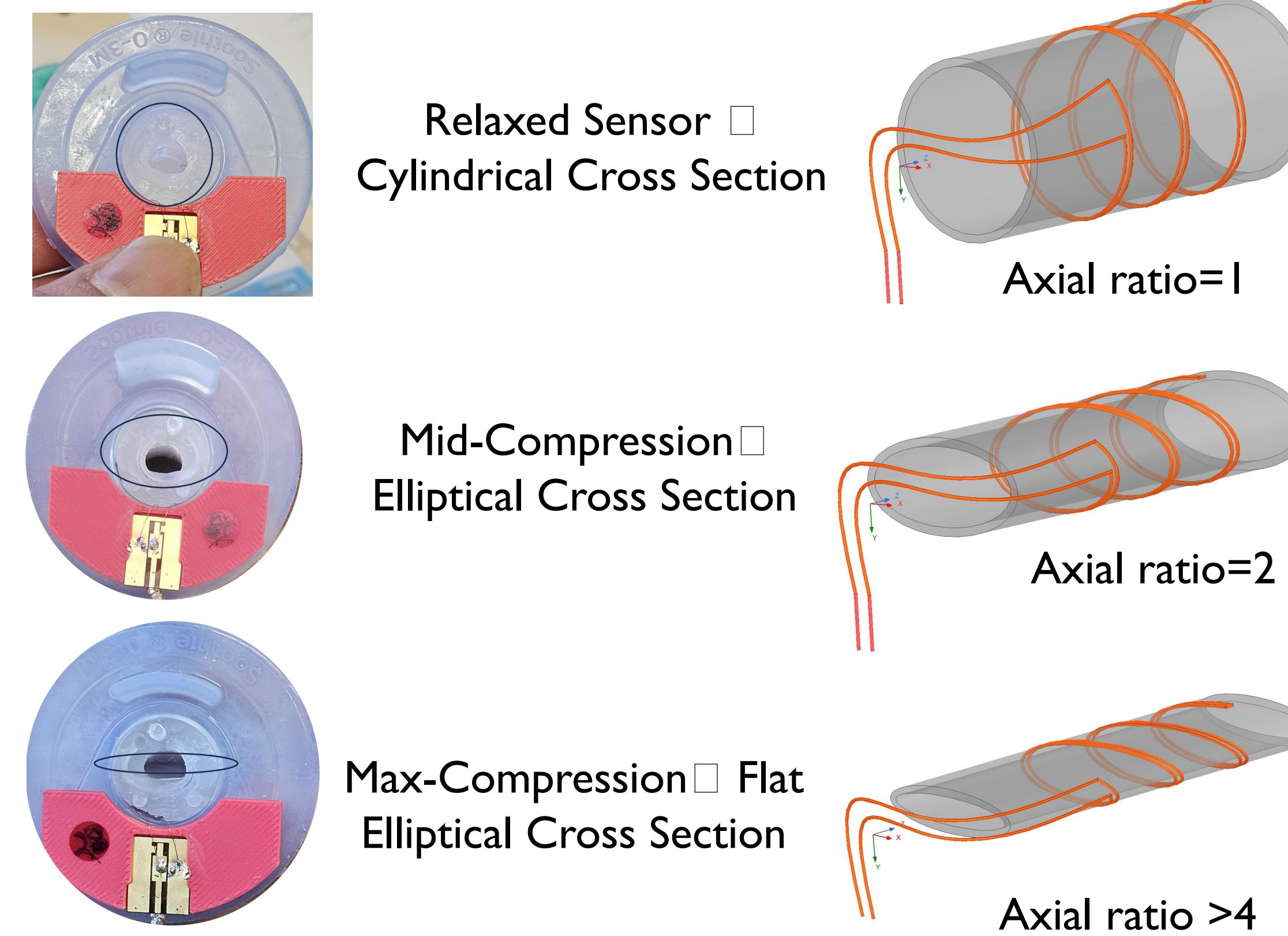


Human Intraoral evaluation

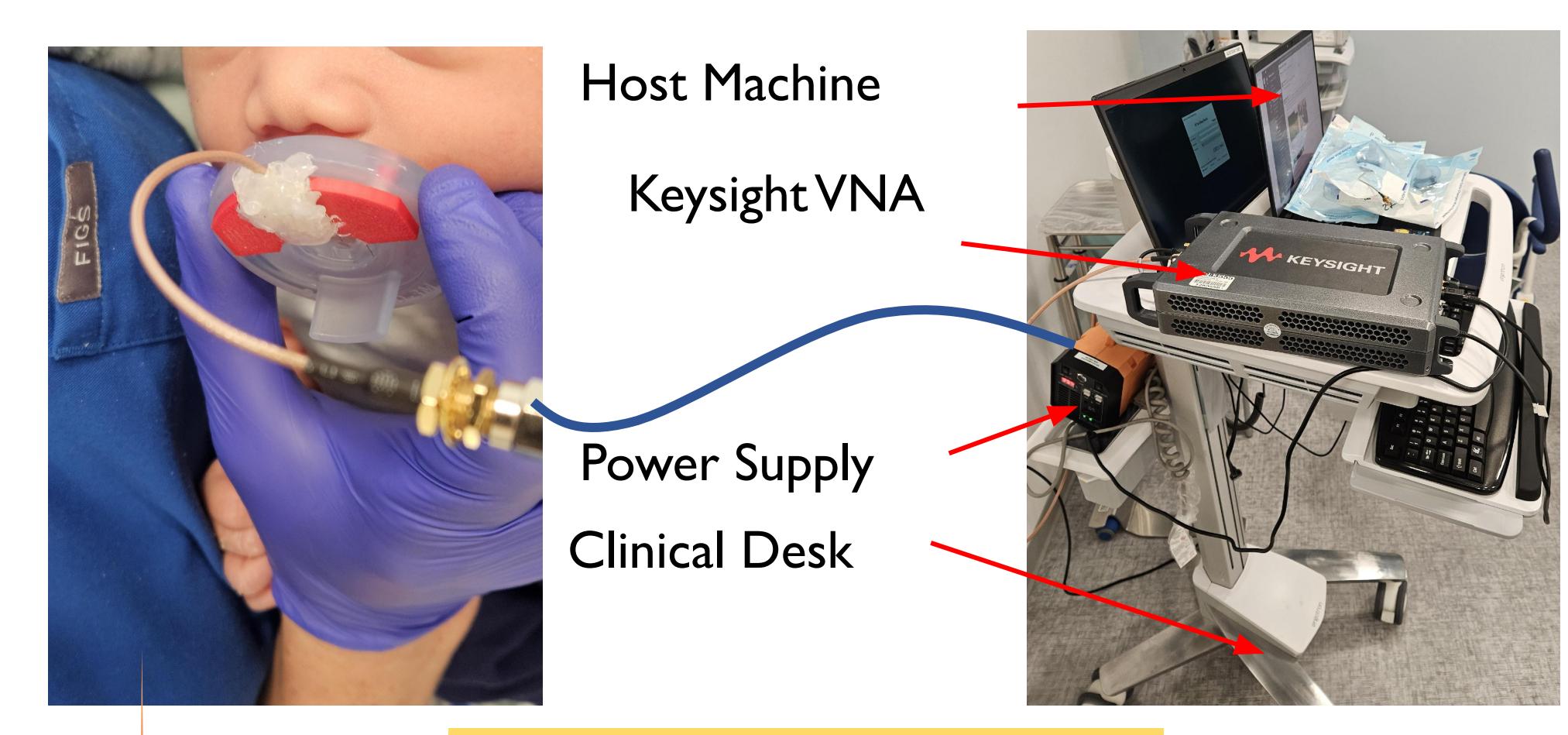
- Sensor Validation: repeated use by Adult
- Recorded phase range and rhythm



### Working Principle



PaciForce measures the deformation of soft-core sensor under gentle compression using signal phase



Classification: Healthy Infant (phase range  $>3^\circ$ )

PaciForce can measure gentle compressive forces during non-nutritive sucking

### Future-Work

- Simultaneous Force/Pressure Sensor
- Wireless version of PaciForce.



PaciForce can accurately diagnose both irregular sucking rhythm and improper latching action.

### Summary

- PaciForce is the world's first, pacifier-embedded diagnostic force sensor designed to objectively measure infant oral motor function during non-nutritive sucking (NNS).
- PaciForce quantifies compression using soft, biocompatible sensors integrated into a familiar pacifier form factor.
- It enables real-time readout of these gentle infant-oral forces, we provide clinicians with actionable data to assess latch quality and feeding readiness.