NRI: Integrated Soft Wearable Robotics Technology to Assist Arm Movement of Infants with Physical Impairments

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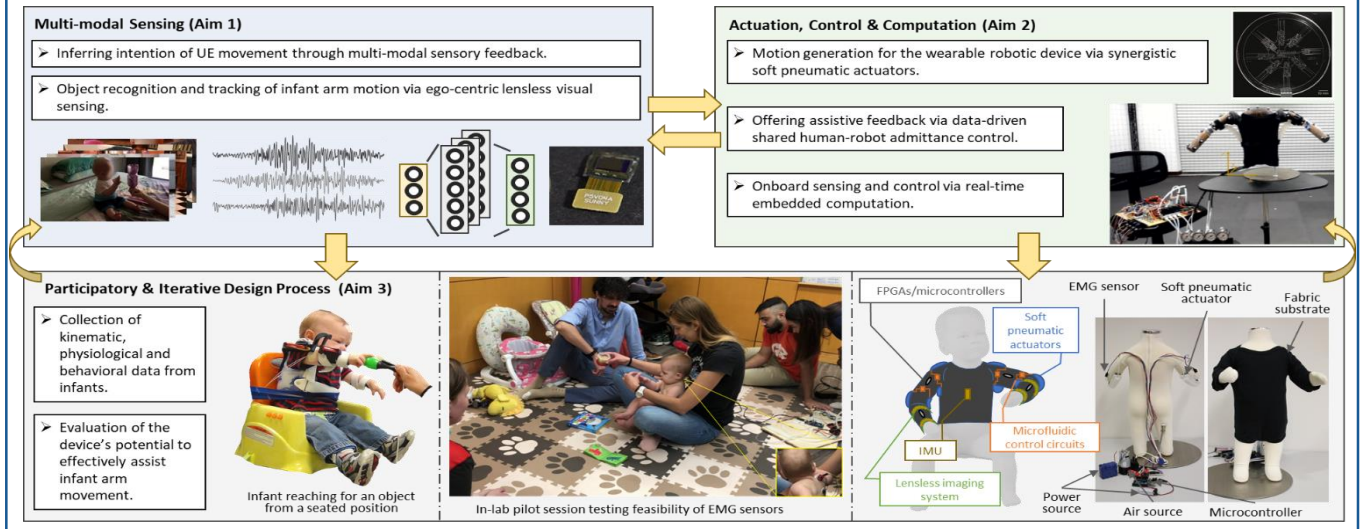
Motivation and Goal of this Project

- ➢ Need to provide infants with or at risk of physical impairments with devices that detect, measure, inform, and adjust to changes in learning and growth
- ✓ Iterative design, development and evaluation an actuated, adaptive and user-centered pediatric upper extremity (UE) soft pneumatically-actuated wearable robotic device

Proposed Approach



Preliminary Results

- Design of a soft-actuated wearable prototype and testing with an engineered mannequin in open loop [1]
- Infant reaching action-recognition from stationary off-body cameras in unconstrained environments [2]
- Pneumatic soft logic circuit design and testing to operate multiple soft actuators with fewer valves [3]

[1] E. Kokkoni, Z. Liu, and K. Karydis, "Development of a Soft Robotic Wearable Device to Assist Infant Reaching," ASME Journal of Engineering and Science in Medical Diagnostics and Therapy 2020.

[2] A. Dechemi, V. Bhakri, I. Sahin, A. Modi, J. Mestas, P. Peiris, D. Enriquez Barrundia, E. Kokkoni, and K. Karydis, "BabyNet: A Lightweight Network for Infant Reaching Action Recognition in Unconstrained Environments to Support Future Pediatric Rehabilitation Applications," IEEE RO-MAN 2021.

[3] S. Hoang, K. Karydis, P. Brisk, and W. Grover, "A Pneumatic Random-access Memory for Controlling Soft Robots," PloS one 2021.