Joint Juice: A Low-Cost Task Trainer for Joint Access

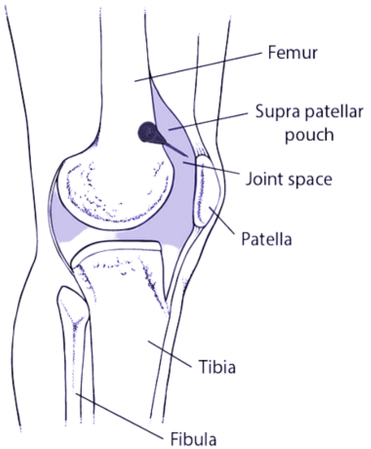
Justin Zhou[1], Ryan Chan[1], Charlotte Cheng[1], Kaitlyn Storm[1], Anson Zhou[1], Andrea Cheng[1], Connie Chen[1], Alan Mao[1]
Antony Fuleihan[1], Won Jun Kuk[2], Tiffany Fong[2], Constanza Miranda[1]

[1] Department of Biomedical Engineering, Johns Hopkins University; [2] Department of Emergency Medicine, JHU School of Medicine

Unpracticed clinicians performing joint aspiration and injection need to improve procedural competence in order to successfully enter the joint space and minimize damage to surrounding anatomical structures**.*

Clinical Background

Joint access is essential for both **joint aspiration** and **injection** and is used for the **diagnosis** of joint conditions and to provide **therapeutic relief** to inflamed joints.



Arthrocentesis procedure
Villa-Forte, Merck Manual (2020)

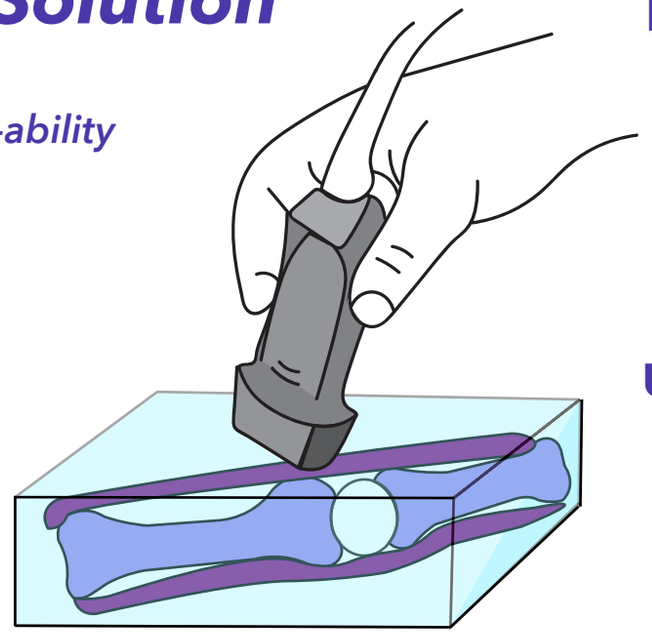
Existing hand and wrist simulators have **minimal functionality** at **high cost**

Many trainees perform their first procedure on live patients, causing **damage** to the patients' joints.

* having completed less than 10 previous procedures or having over 6 months between procedures; ** including tendons, nerves, vasculature and bones

Our Solution

- *Ultrasound-ability*
- *Biofidelity*
- *Visual Feedback*



Needs Criteria

Must Have	
1	*Avoid injuring anatomical structures*
2	*Increase viable sample amount*
3	*Accurate Physiology*

Ultrasound Testing

Workflow

Medical School → **Begin Residency** → **Practice on Joint Simulator** → **Successful Live Procedure**