GAJA: PROOF-OF-CONCEPT MSK-US GUIDED SELF-ACQUISITION

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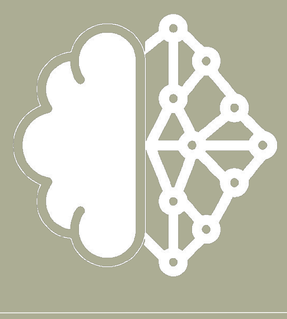
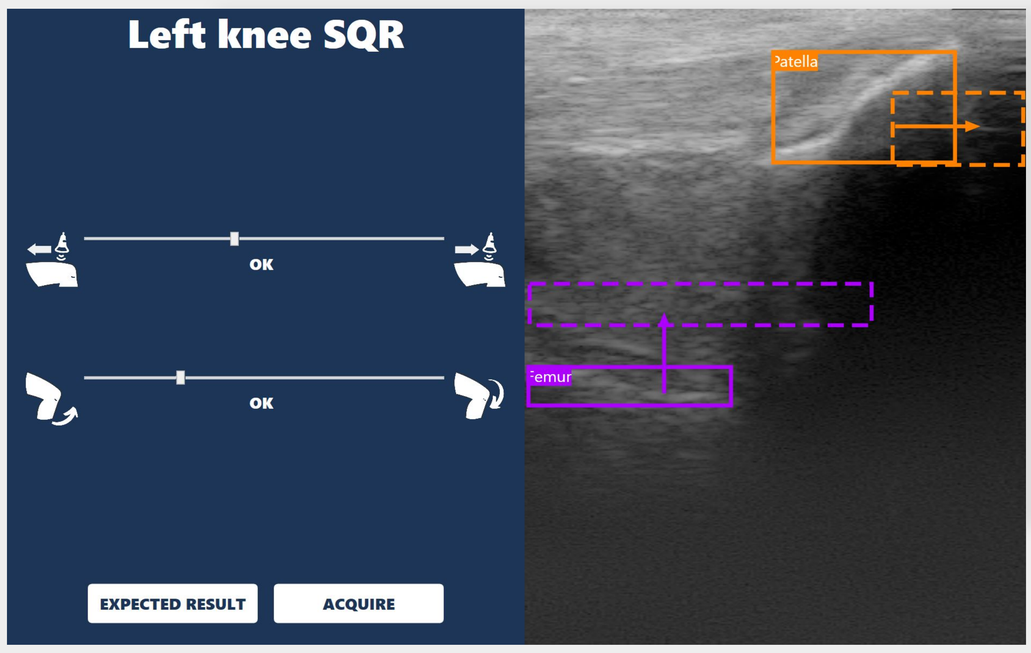
Introduction

- Hemofilia, if not promptly treated, can lead to permanent joint damage
- In-hospital visits are costly and not always feasible when required
- The adoption of portable US probes enables point-of-care (P.O.C.) evaluation
- Existing approaches to P.O.C. self-acquisition of MSK-US:
  - The practitioner supervises the procedure remotely → time consuming for the practitioner
  - The patient is autonomous after a long training → patients tend to forget the procedure

First visit in-hospital	Guided self-acquisition at P.O.C.	Quality assessment at P.O.C.	Remote evaluation at hospital
			
The practitioner acquires the reference image → detection of personalized anatomical markers	GAJA guides the patient to align anatomical markers to the reference and then acquires 10 frames	GAJA checks if at least one frame is suitable for the diagnosis	Images are sent to the hospital for a remote evaluation

Design principles

1. **Automate**: some operations are automated in the system (e.g. probe depth and gain setting)
2. **Guide**: the application guides in real-time the alignment of anatomical markers (solid lines) to the reference anatomical markers (dotted line) with visual indications
3. **Remind**: basic operation are left to the patient, and reminded before the acquisition page (e.g. how to position the probe, to apply gel etc…)



Conclusion

GAJA shows on a preliminary evaluation:
- Conducted on **23 healthy participants**
- Only **one** in-hospital visit, with a **short** training time: ~1-5 minutes
- **High** suitable acquisition rate: ~87% of patients collected at least one suitable image
- Patents acquired the images in **less** than 1 minute.

We conjecture that the **Automate-Guide-Remind** principle will ensure the quality of the acquired images during **time**

Reference: Colussi M., Mascetti S., Ahmetovic D., Civitarese G., Cacciatori M., Peyvandi F., Gualtierotti G., Arcudi S. and Bettini C.. GAJA - Guided self-Acquisition of Joint ultrAsound images. International Workshop on Advances in Simplifying Medical Ultrasound,2023.