ME 327: Design and Control of Haptic Systems
Spring 2020

Interactive Session 12: Kinesthetic haptic devices: multi-DOF rendering

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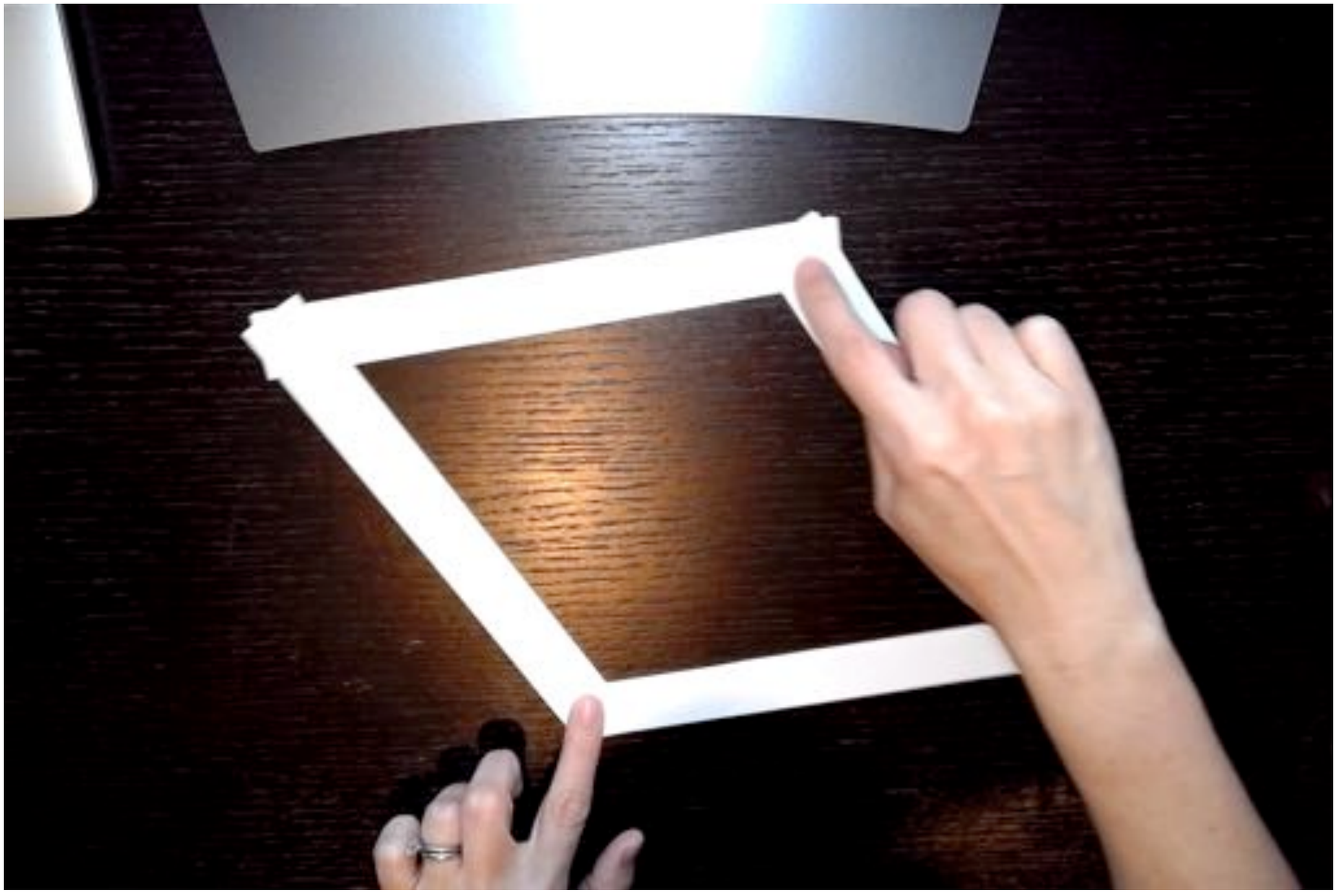
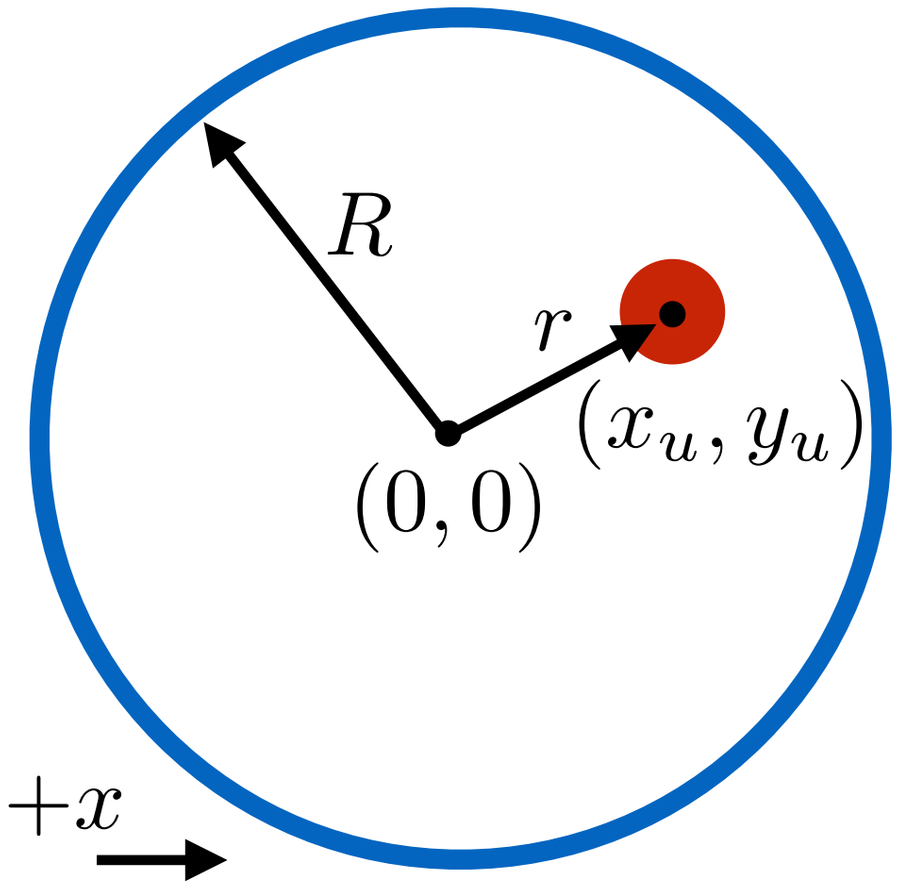
Pantograph Demo



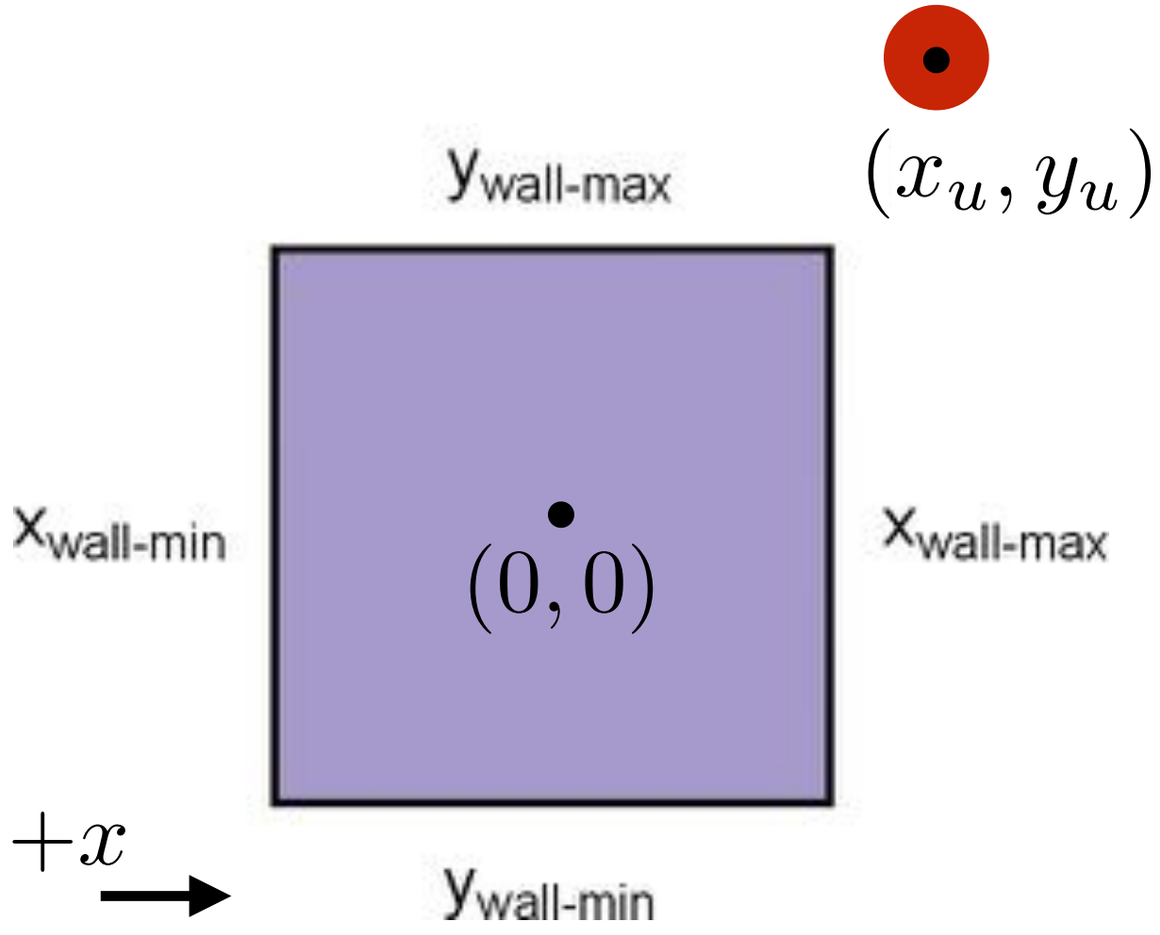
Questions from prerecorded video?

How would you render (in 2D)…

The inside of a circular shell

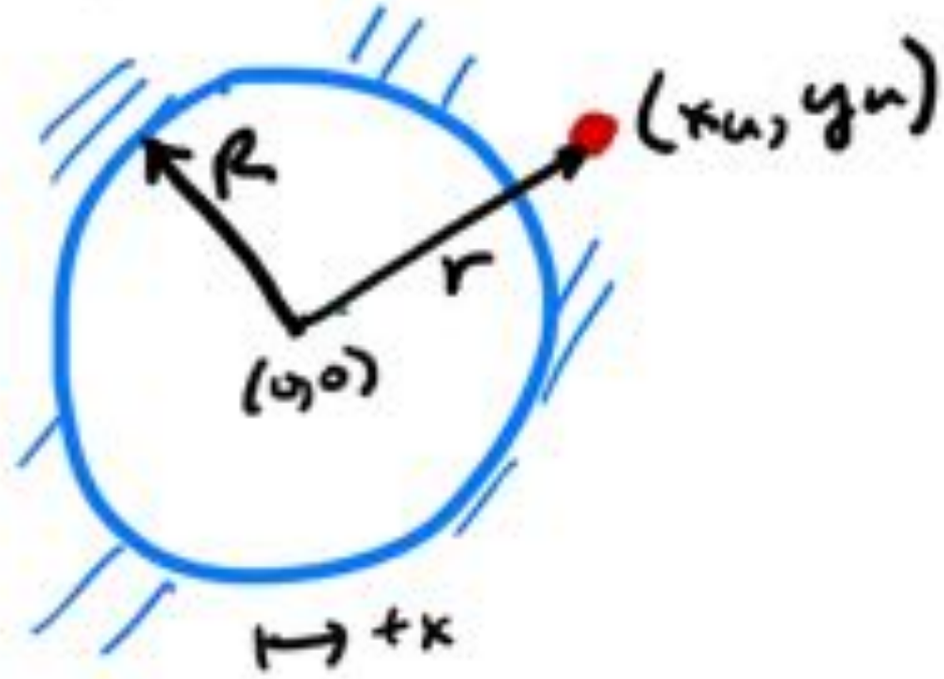


The outside of a box



Include collision detection!

Circle (inside)



$$|r| = \sqrt{x_u^2 + y_u^2}$$

if $|r| \geq R$,

$$\hat{r} = \frac{1}{|r|}\begin{bmatrix} r_x \\ r_y \end{bmatrix}$$

$$\vec{f} = -k(r - R)\hat{r}$$

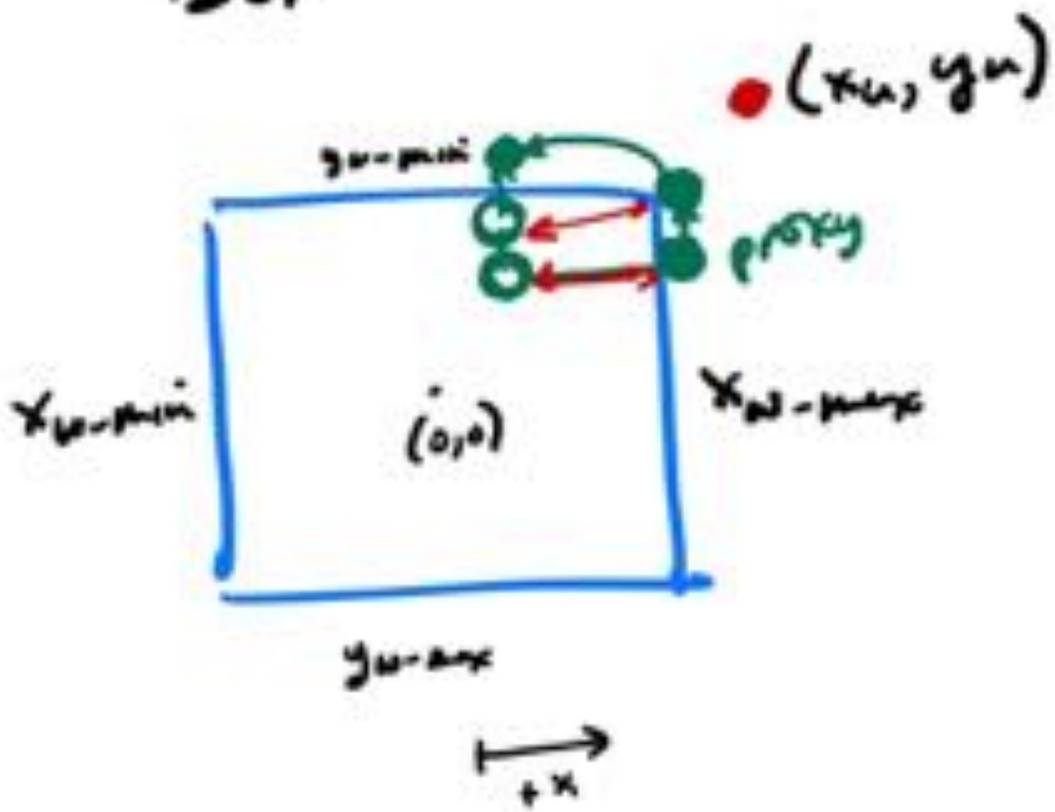
or

$$= -k(|r| - R)\hat{r}$$

$$\vec{r} = \begin{bmatrix} x_u \\ y_u \end{bmatrix}$$

$$\vec{r} = \begin{bmatrix} r_x \\ r_y \end{bmatrix}$$

Box

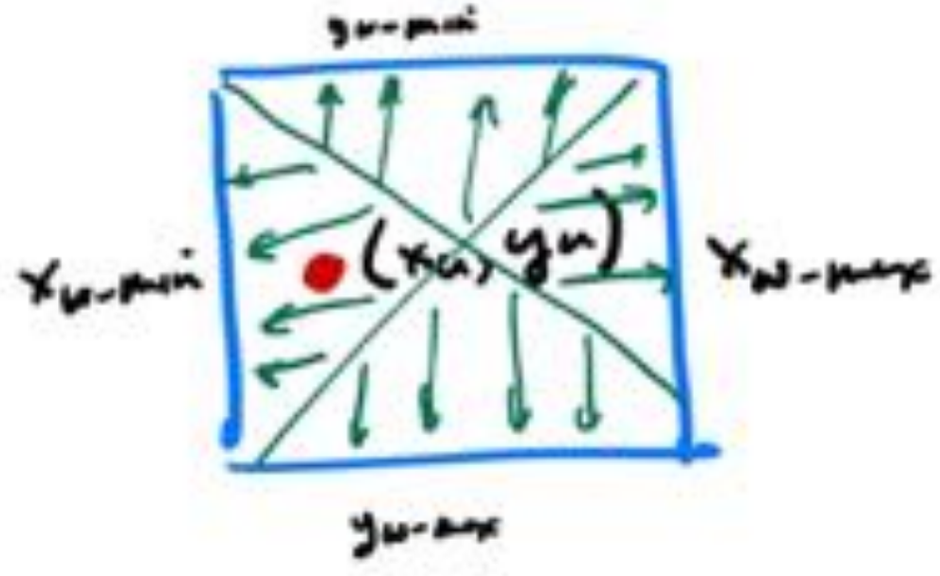


Ideas:

Condition: if x_u is between $x_{wall\,min}/x_{max}$ & y_u is between $y_{wall\,min}/y_{max}$

if first true → set proxy to that wall

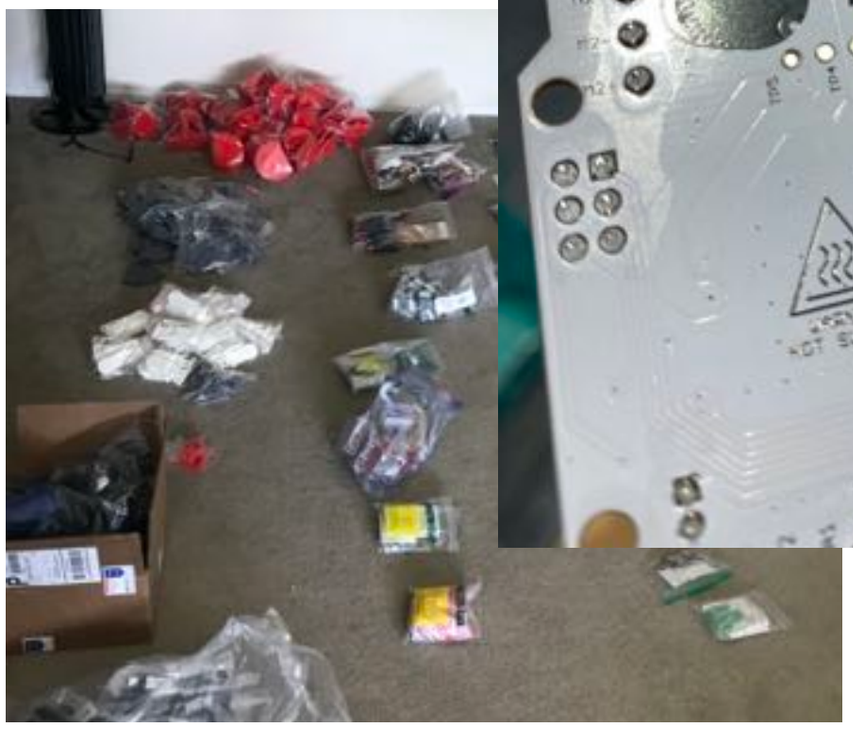
} proxy-based



} penalty-based

Phantom Omni Rendering Demo

Hapkits



Reminders:

Assignment 5 due today
Assignment 6 to be posted today

Hapkit notes: Parts check (don't worry about intact alligator clips), superglue safety requirement, and prep for next week's interactive sessions

Quiz 2: 60 minutes, next Friday (Friday May 22)

Office Hours/Q&A with Allison until 10 am.
Question queue (see tab with today's date):
https://tinyurl.com/HapticsAllison

