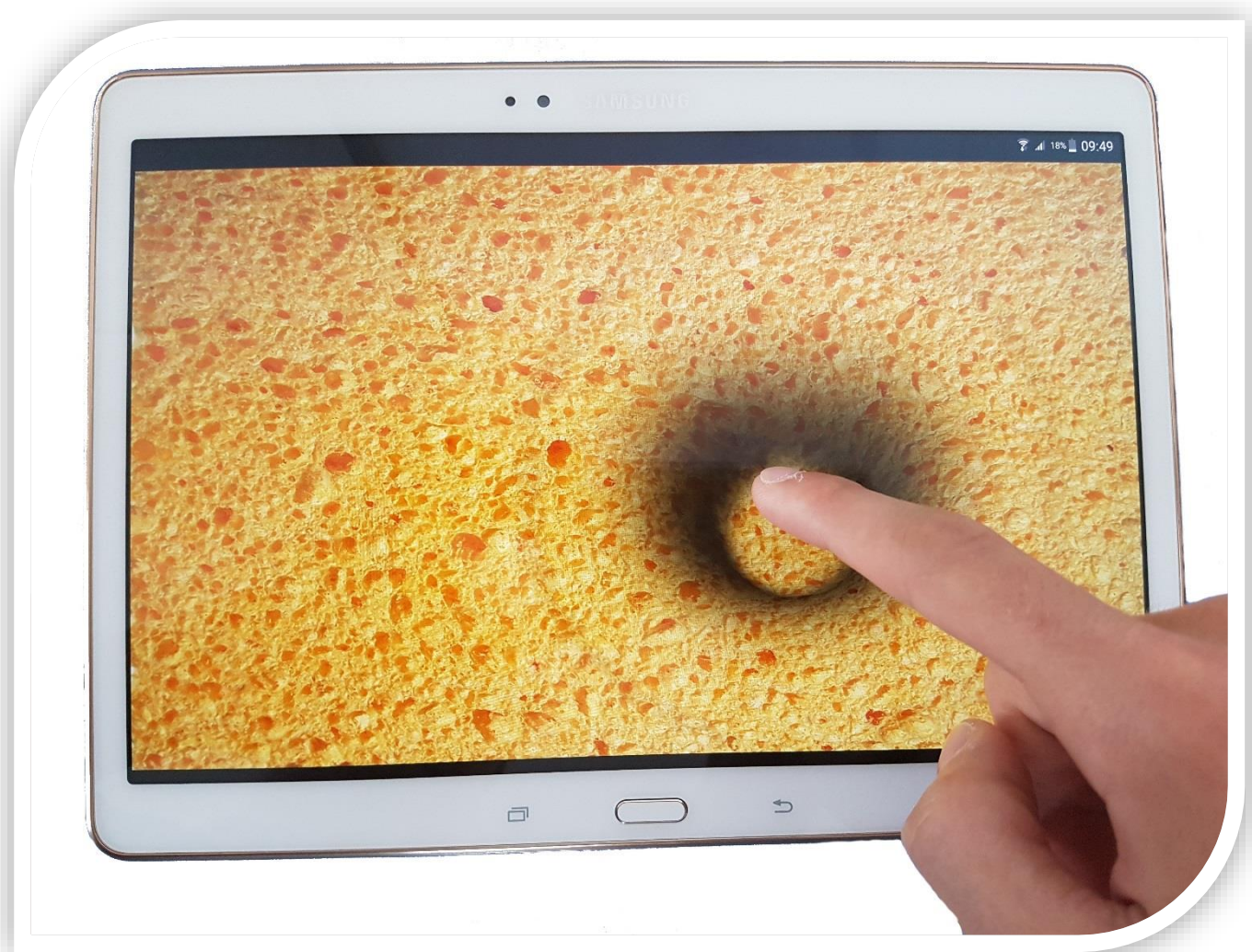


# Texture Rendering on a Tactile Surface using Extended Elastic Images and Example-Based Audio Cues

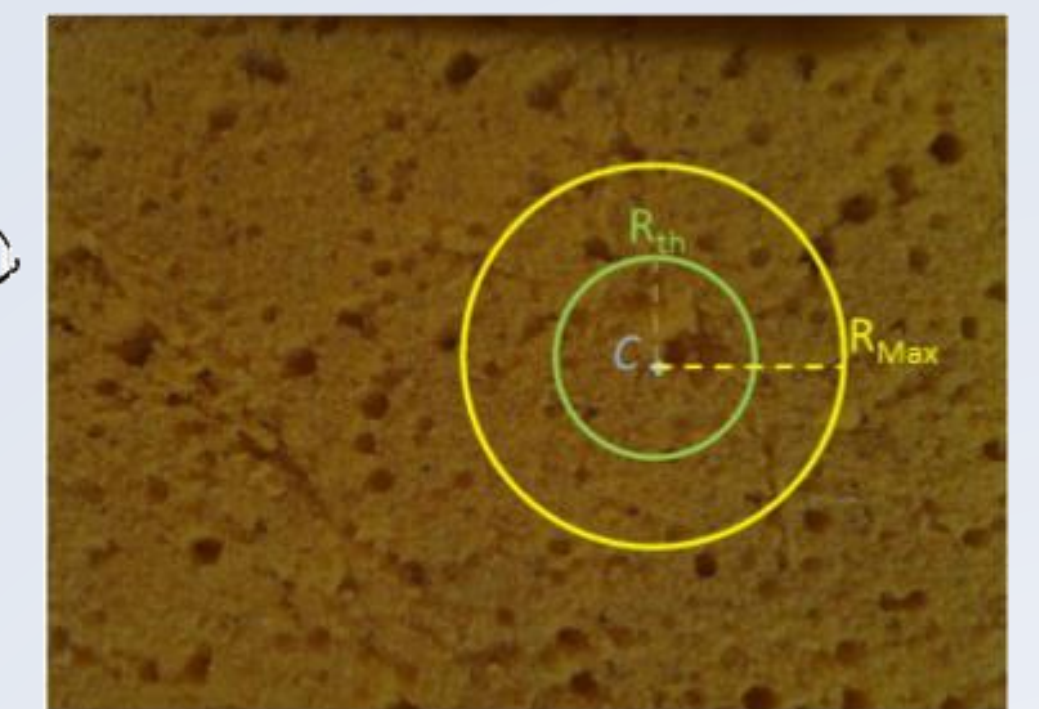
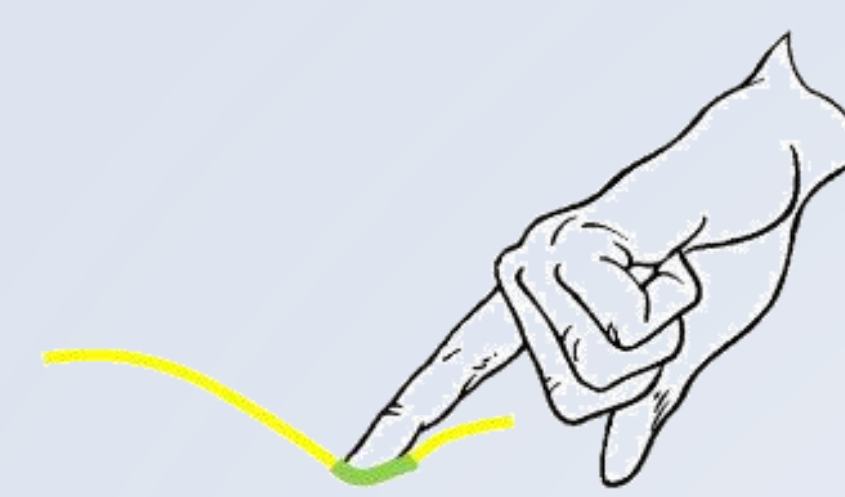
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Technicolor R&I



A texture rendering system relying on pseudo-haptic and audio feedback has been developed. While the user touches the texture displayed on a tactile screen, the image is deformed according to the contact area and the rubbing motion to simulate pressure. Additionally audio feedback is synthesized in real-time to simulate friction. This system can be implemented on any existing tactile screen without any extra mechanical device.

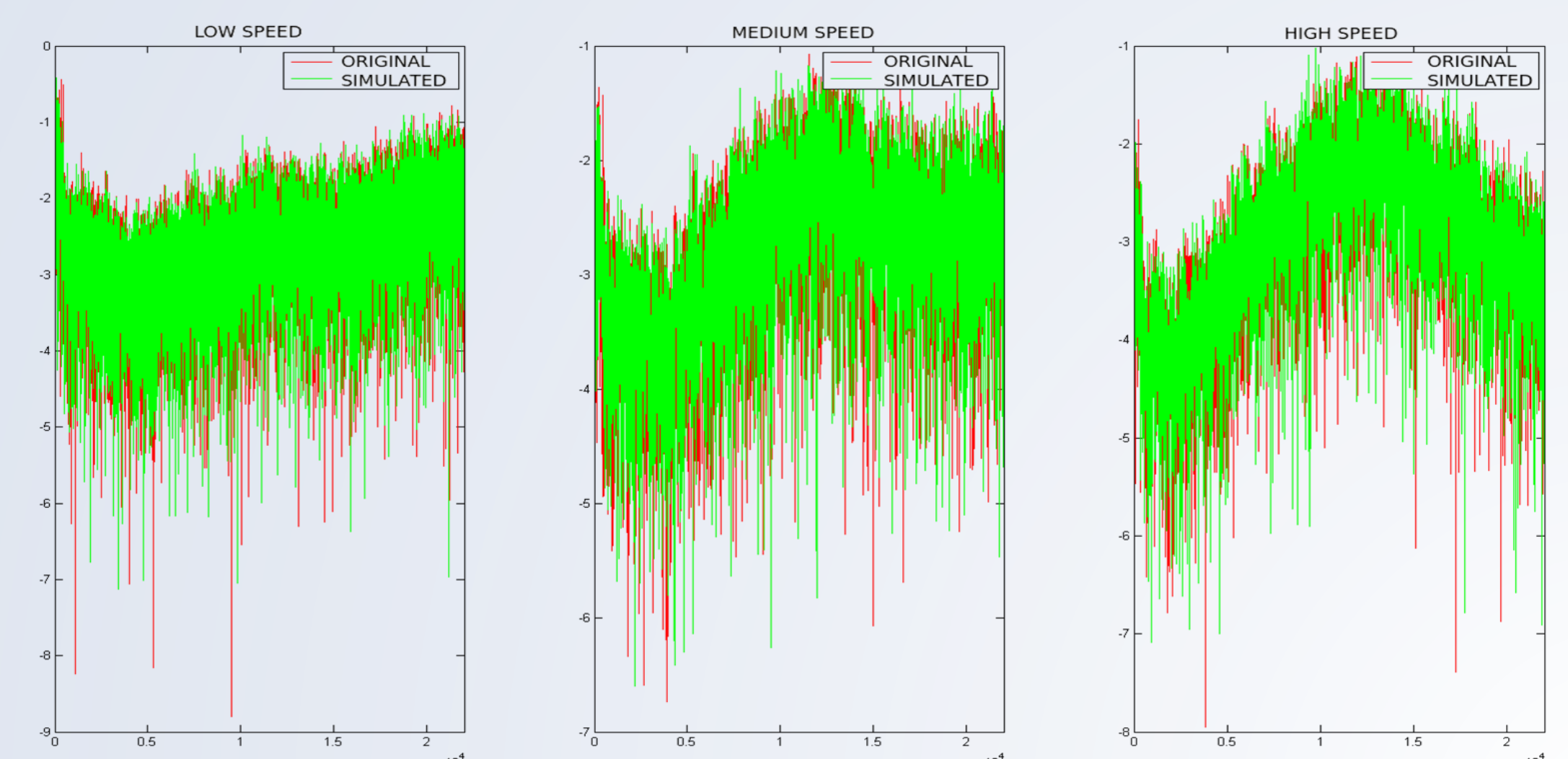
## Pseudo-haptic Rendering

- Contact Model → Extension of elastic image [1]
  - Deformation of surface under contact area
  - Deformation of surface around contact area
- Viscoelastic Model
  - Dynamic deformation



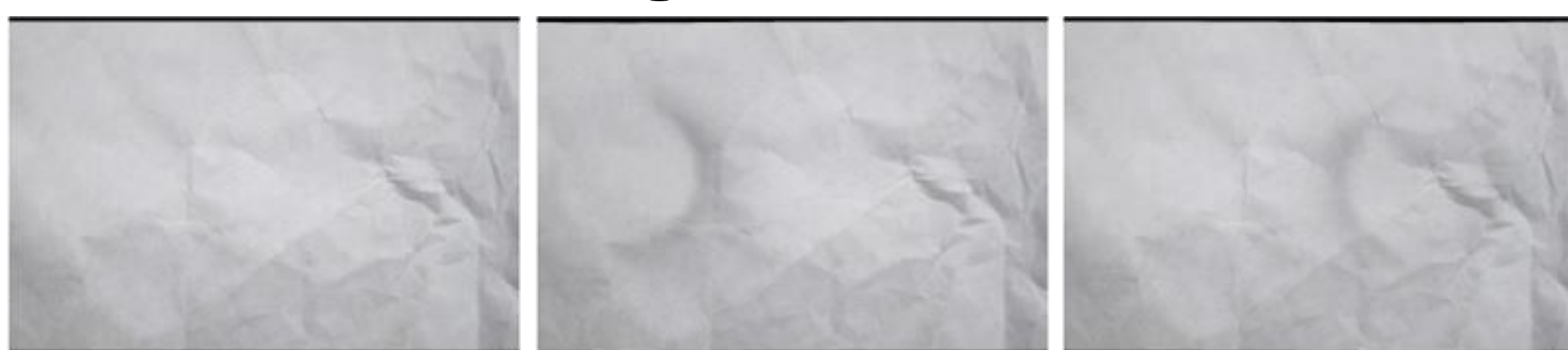
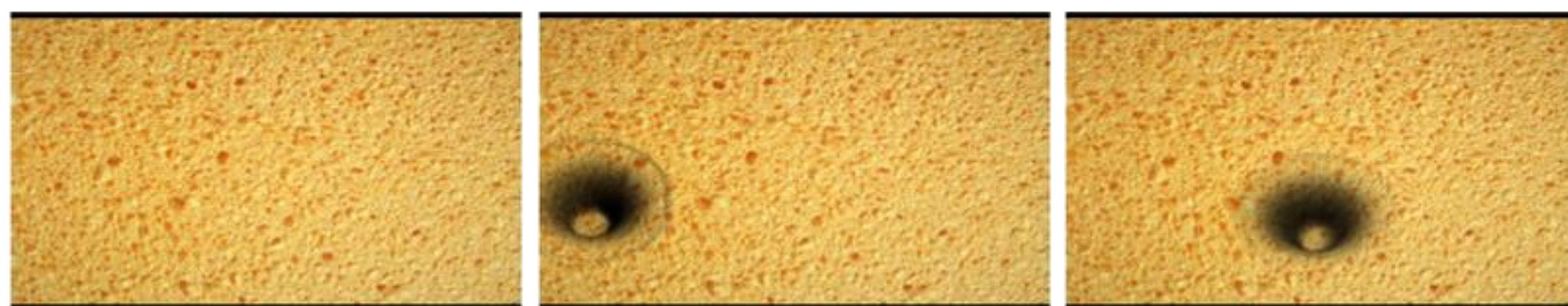
## Example-Based Audio Synthesis

- Learning step
  - audio samples for low, medium and high rubbing speed
  - AR model, IIR filter
- Generation step
  - Depends on rubbing speed

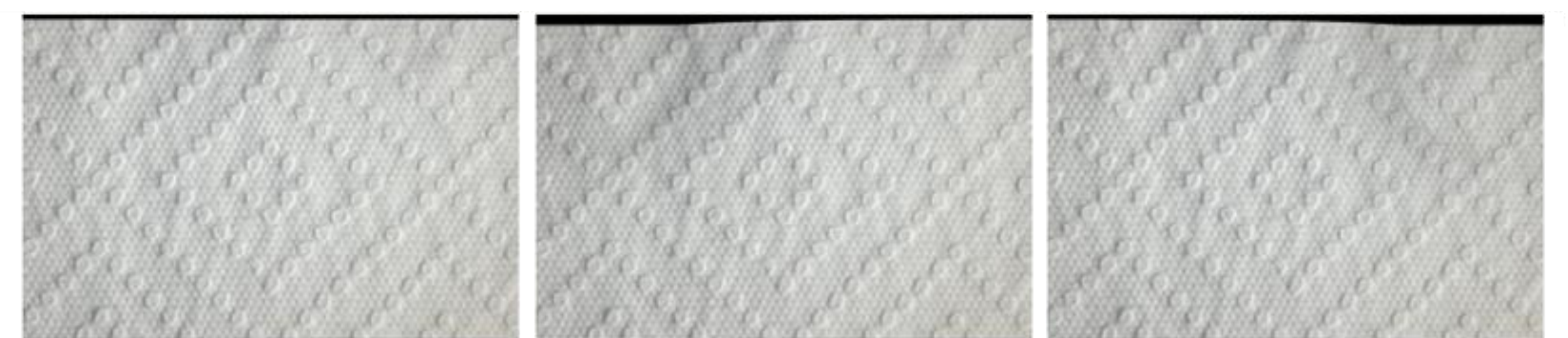


## Results & Discussion

- Preliminary tests with four materials
- Better suits elastic material with regular structure
- Sponge
  - Visual: elastic model well adapted
  - Audio: AR not adapted to macroscopic relief
- Paper
  - Visual: model not adapted to solid material
  - Audio: AR fits regular structure



- Paper towel
  - Visual: light deformation suitable
  - Audio: AR well adapted



- Carpet
  - Visual: strong deformation suitable
  - Audio: well adapted



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## References

[1] Argelaguet, F., Jauregui, D.A.G., Marchal, M., Lécuyer, A.: A novel approach for pseudo-haptic textures based on curvature information. In: Haptics: Perception, Devices, Mobility, and Communication, pp. 1–12. Springer (2012)