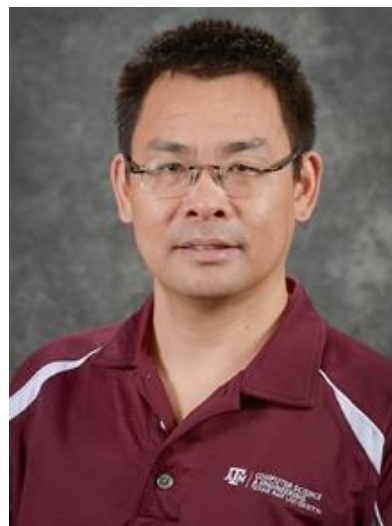


# NRI: FND: OPTOACOUSTIC MATERIAL AND STRUCTURE PRETOUCH SENSING AT ROBOT FINGERTIP

NRI-1925037, Section 4, Poster #5



**PI: Dezhen Song**

**Co-PI: Zou Jun**

*Texas A&M University*

# SENSOR-BASED GRASPING

- **Camera or Lidar**
  - Occlusion and appearance only
- **Tactile Sensing**
  - Require physical contact
- **Proximity sensors**
  - Optical sensors: Cannot handle transparent / highly reflective targets
  - E-field sensors: Cannot materials with low dielectric contrast to air
  - Ultrasonic sensors: Limited Lateral Resolution

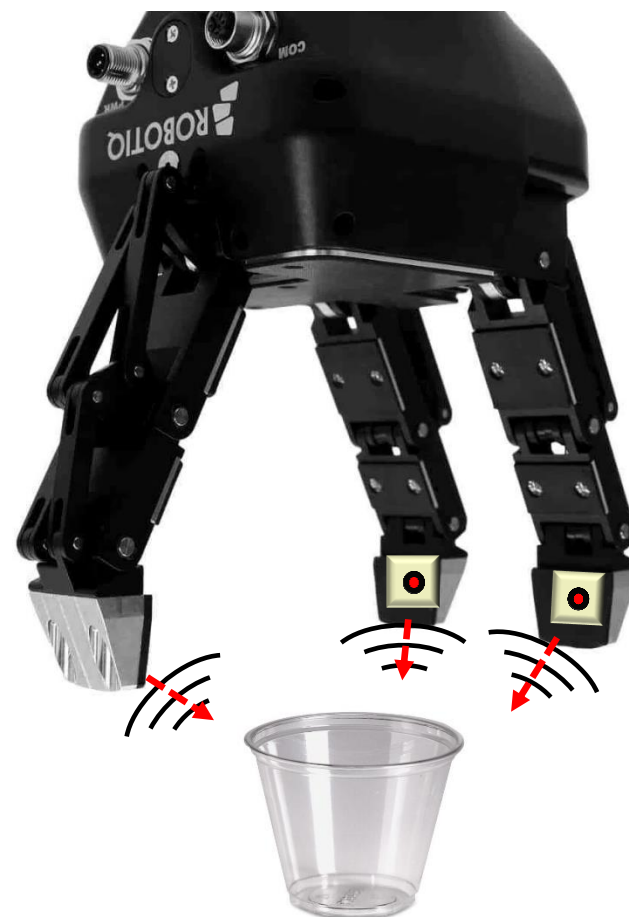


*amazonpickingchallenge.org*

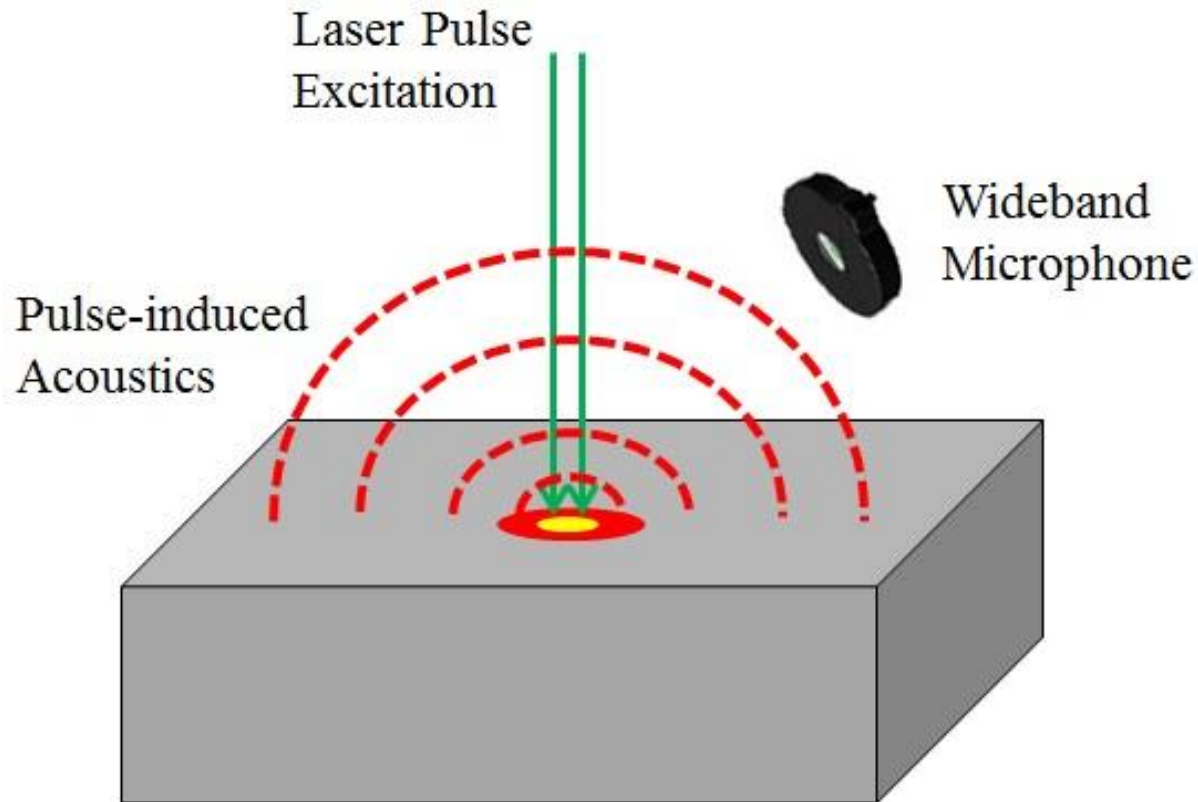


*Hsiao, Kaijen, et al. 2009.*

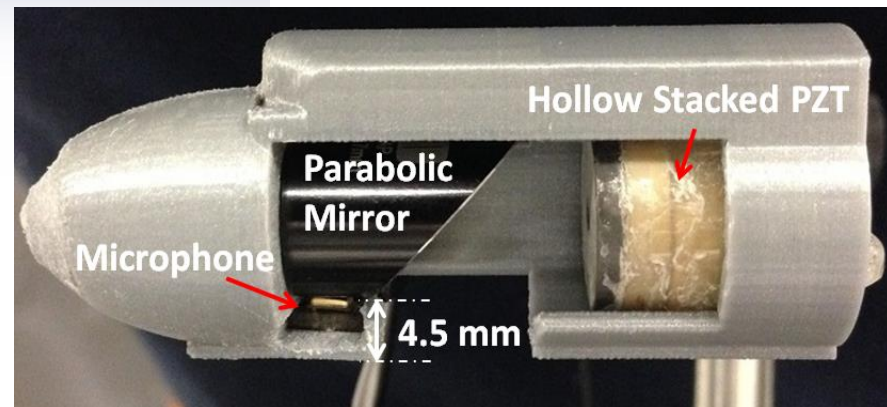
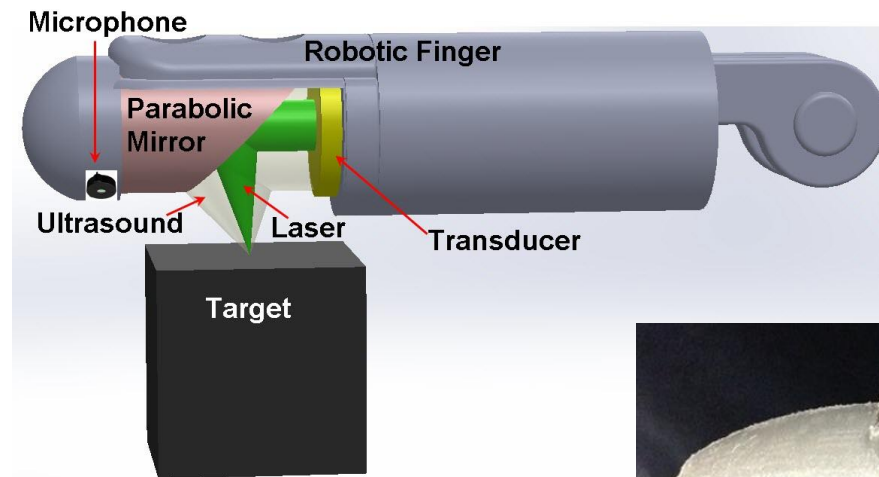
# NON-CONTACT MATERIAL RECOGNITION AND NEAR-DISTANCE RANGING FOR ROBOTIC GRASPING



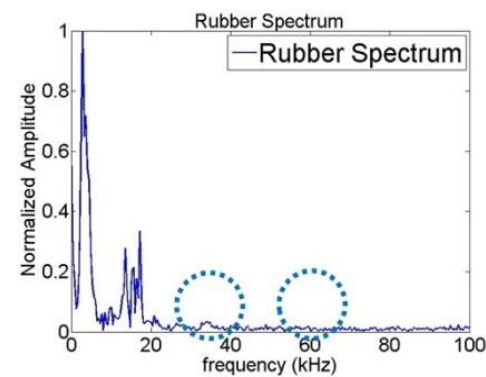
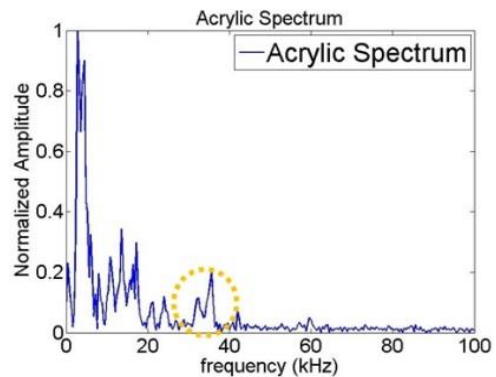
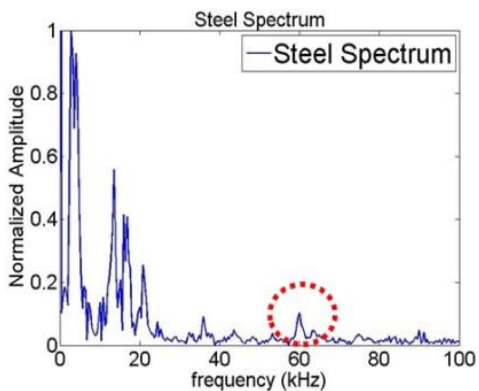
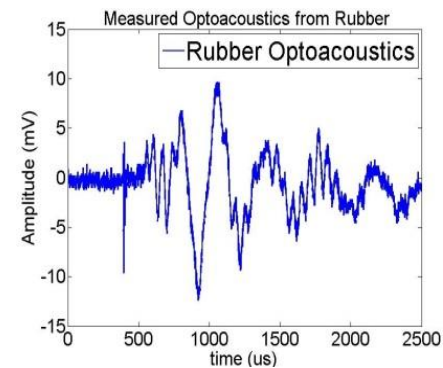
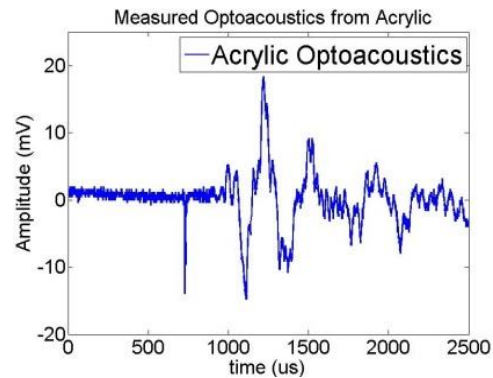
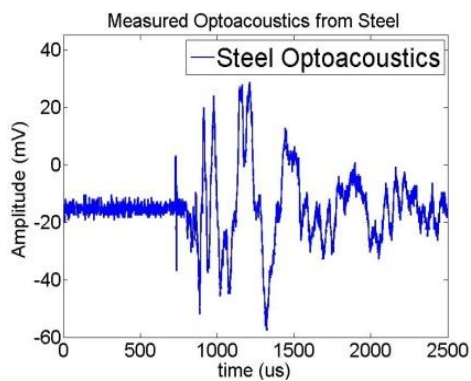
# OPTOACOUSTIC EFFECTS



# DESIGN DIAGRAM AND PROTOTYPE



# SAMPLE RESULTS



**Steel**

**Acrylic**

**Rubber**

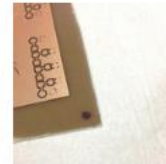
# MATERIAL DATABASE



Acrylic



Glass



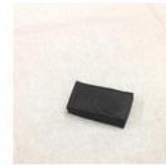
Epoxy

Aluminum  
Foil

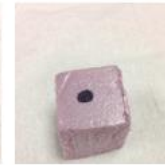
Plastic



Rubber



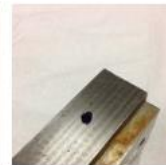
Sponge



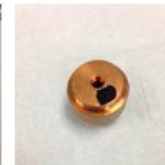
Foam



Aluminum



Steel

Zinc Coated  
Iron

Copper



Bamboo



Basswood



Pine Blocks



Oak Rod

# THANK YOU!

