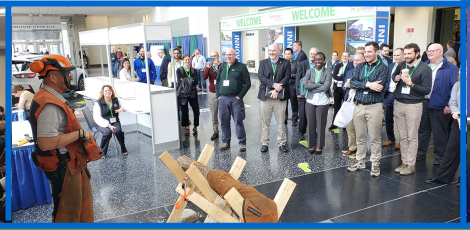
2024

massDOT Transportation Innovation Conference





# Optimized Crosswalk Push Button

Michael Ambrozie, Isaac Fong, Nathaniel Pyo, Wendy Quizhpi

Northeastern University: Enabling Engineering

massDOT
Massachusetts Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

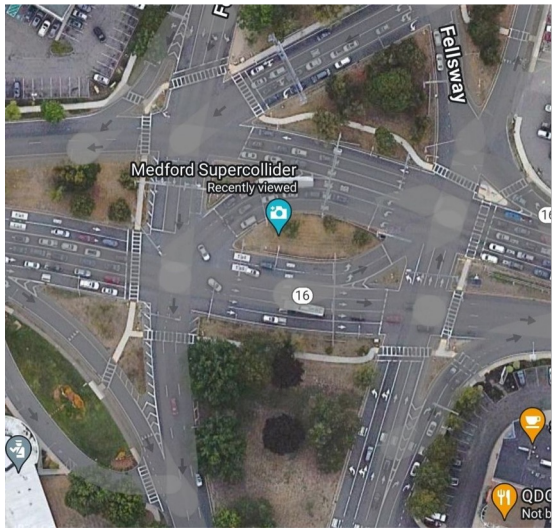
# Who We Are

Northeastern University
Enabling Engineering Course

# MassDOT: Medford Supercollider

***Vision:***

Safer, intuitive, “complete streets”:
Accessible for pedestrians of all abilities




# Problem Statement

Standard pedestrian crosswalk models fail to offer complete, accessible, and intuitive directional communication, particularly due to poorly visible or loose arrows. Additionally, state change and indication of input is not always clear.


Extruded Arrow

Small Red Light

Microphone

Speaker

Haptic Feedback

Button Assembly


3-Part Arrow: Directional Haptic Feedback

Light Array: Clarify State Change

Directional Lighting

Increased Visibility

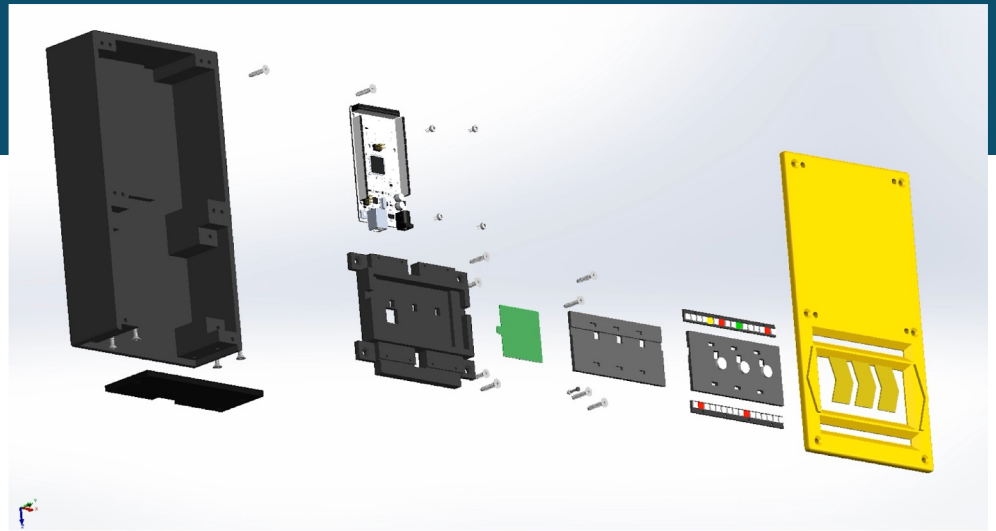
# Our Solution: Product

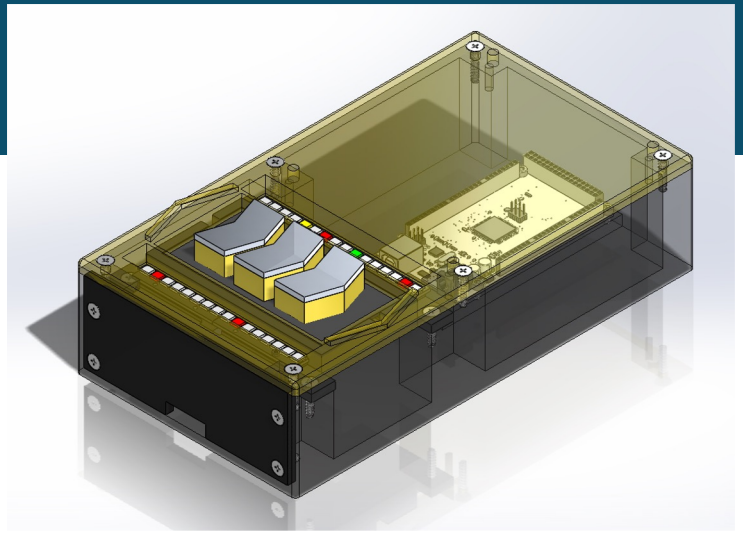
vibrational differentiation · visuotactile communication · clear state change




START CROSSING
Watch For
Vehicles
DON'T START
Finish Crossing
If Started
FLASHING
TIME REMAINING
To Finish Crossing
TIMER
STEADY
DON'T CROSS
PUSH BUTTON
TO CROSS

# Mechanical Design

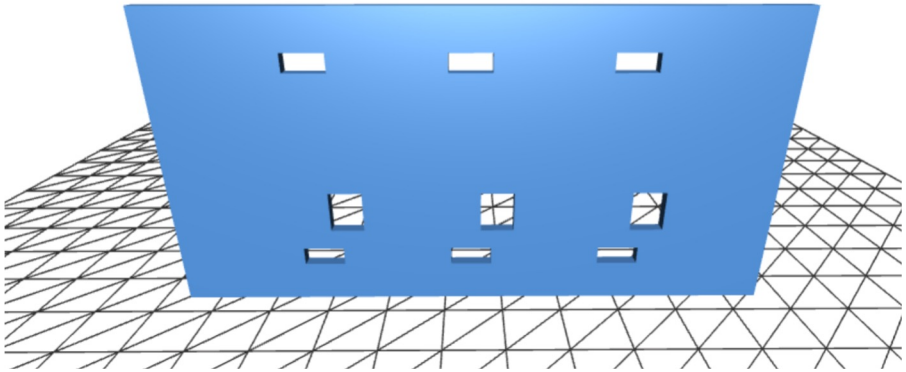


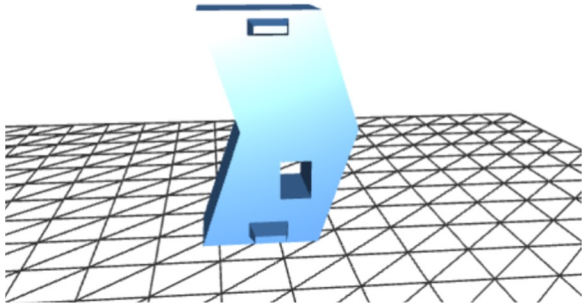


# Differentiability

Individual vibrations must be differentiable to communicate direction

- Flexible base plate: sensor input and vibrational dampening
- Peg design: minimize and dampen contact surfaces

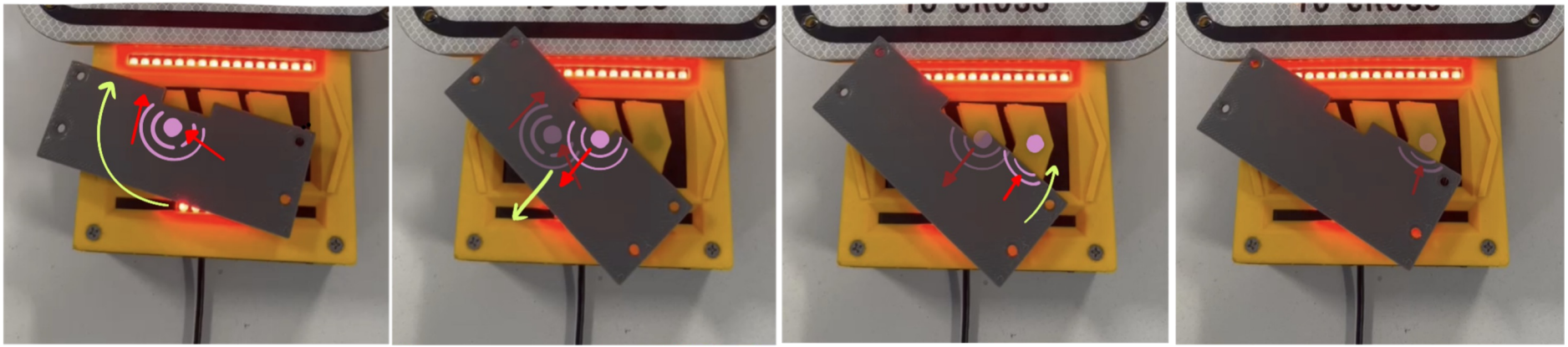





Vehicles
DON'T START
Finish Crossing
If Started
TIME REMAINING
To Finish Crossing
STEADY
DON'T CROSS
PUSH BUTTON
TO CROSS

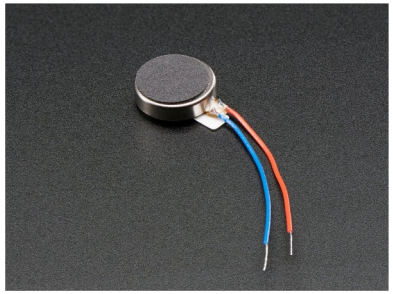
# Video Explanation

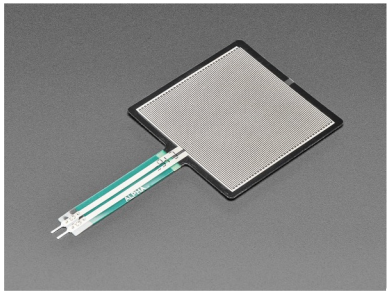
Three distinct responses to individual arrow vibrations indicate isolation;
Vibrational waves push and pull to create observed response

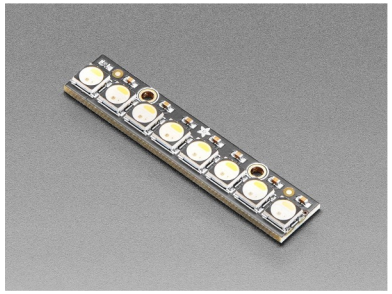


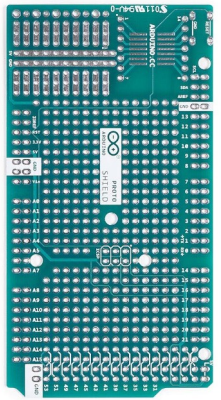
# Parts and Assembly

Total Cost for Single Unit: $167.52 (Including Arduino and filament)









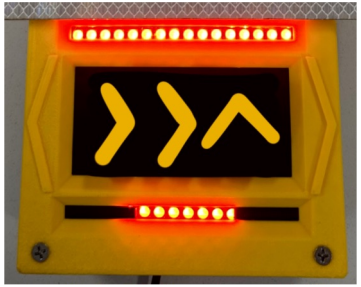


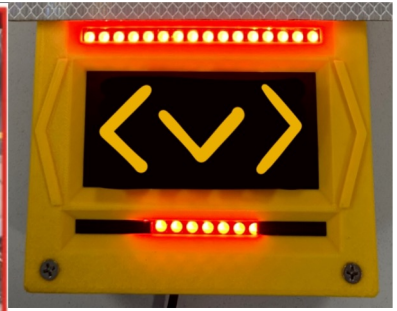
# Future Considerations

***Next Steps***

Concrete: Implementation with existing/developing PAS

3-segment versatility: multidirectionality · vibrational manipulation





# Thank you

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