

# FIRST project: “Real World”

**Crosswalk button pusher  
for wheelchair user without  
use of arm**

# The situation



# The need

- Some wheelchair users have very restricted arm motion
- Operate wheelchair with small motions of a lever or joystick
- Can travel on urban sidewalks but
- Cannot push Ped Xing button
- Need help, but

# The solution: smart robot arm

- Attaches to wheelchair
- Simple for user to extend/retract
- Locates and pushes crosswalk button
- Retracts out of the way

# User experience

- Scoot up close enough so button is within reach
- Operate “push the PedXing button”
- Arm finds button and pushes it
- Arm retracts (or else user commands retract)
- No worries about whacking other ped

# Arm capabilities

- Readily attachable to many wheelchair models
- “Push” lever/button/touch easy to attach
- “Push” doesn’t interfere with driving wheelchair
- Cam can visually identify PedX button
  - Buttons are standard height
- Arm can press hard enough, but has safety sensors
- Doesn’t need gripper, just a fist

# Just a few project aspects

- Mechanical design
  - How many joints (shoulder, elbow, etc)
  - Size/dimensions
- Motors/actuators
- Share battery with wheelchair, or separate?
- How are parts attached to wheelchair
- Safety sensors
- Lots more

# Harder-core robotics

- Camera and vision to locate button
- Kinematics, motion planning



# Presenting to FIRST judges

- Identify judging criteria
- Document the problem
- Characterize our solution
- CAD drawings (OnShape)
- Animation (Blender)
- Estimate costs
- Business plan etc