SUPPLEMENTARY AUTOMATED BRAKING SYSTEM FOR A WHEELED MOBILITY AID

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PROBLEM STATEMENT

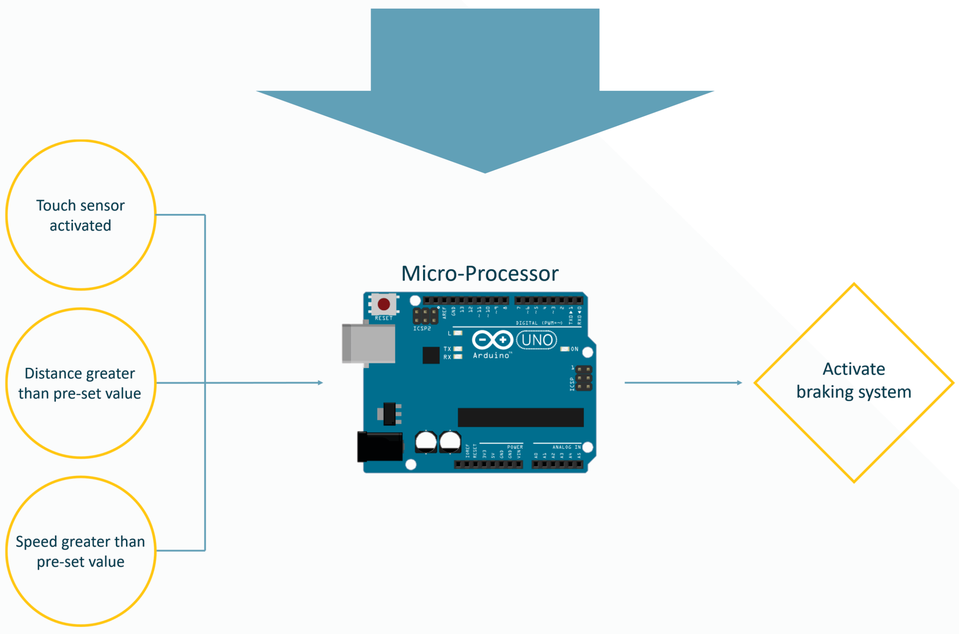
- With an aging population, the number of people using mobility aids has increased
- In the USA, over 1.5 million use walkers [1]
- Correlated is an increase in falls associated with mobility aids, specifically wheeled walkers (i.e. rollators) [2]
- Falls are the leading cause of injury in the senior population, reducing quality of life and independence [3]
- The cost of falls is predicted to be $32.4 billion annually by 2020 [4]

OBJECTIVES

- Develop a supplementary braking system to reduce falls associated with rollators
- Brakes will be activated when the User releases the walker or is situated at an unsafe distance
- The device must brake automatically using collected sensor data
- Manual brakes must maintain functionality
- All components should fit with the space of a standard rollator seat
- In terms of pricing and portability, the design should be comparable to other rollators on the market

HOW DOES IT WORK?

- ***Capacitive touch breakout boards*** and ***copper tape*** located on handles to determine if the User is holding the rollator
- ***ZX distance and gesture sensors*** to ensure that the User is located a distance compatible with standard and ergonomic use
- ***Accelerometer*** located under the seat to detect the rollator's speed
- ***Electric linear actuator*** to apply the braking force to the cables
- ***H Bridge (motor controller)*** to allow the micro-processor to control the polarity of the power delivered to the linear actuator, thus extending and retracting the piston
- ***Toggle switch*** to activate the emergency brake release mechanism



FUTURE WORK

- Perform sensor analysis to optimize specifications and system integration
- Iterate multiple prototypes to explore various braking mechanisms, required braking force, and optimize reaction time
- Investigate sustainable energy sources such as solar or kinetic (generated by wheels)
- Modify and test for outdoor use (i.e. weatherproofing)
- Develop full-scale manufacturing process plan
- Apply for compliance with Canadian safety standards (e.g. ISO 17069:2014)

PROTOTYPE BILL OF MATERIALS

1. ZX Distance and Gesture Sensor
2. Touch Capacitive Breakout Board
3. Copper Tape (External node)
4. Electric Linear Actuator
5. H Bridge Motor Controller
6. Toggle Switch

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