

Background:

With increasing urban populations and pedestrian flow data is essential for cities to optimize sidewalk space, improve safety, and manage congestion effectively. This competition challenges participants to design a Smart Sidewalk Pedestrian Counter that simulates real-world systems used to track foot traffic and detect congestion in crowded urban areas. By using an Arduino and basic sensors, students will create a portable, low-cost solution to count pedestrians, simulate congestion alerts, and manage power efficiently. This hands-on challenge promotes skills in data gathering, sensor integration, and energy-efficient design.

Challenge:

Design a system that monitors both pedestrian and traffic activity. The system should provide a green light for safe crossing, emit a warning sound if pedestrians attempt to cross during traffic, and dim the light after 10 seconds of inactivity to conserve energy.

Layout and Requirements

- **Traffic Detection:** Use the ultrasonic sensor to simulate vehicle detection near the crosswalk.
- **Pedestrian Detection:** Detect pedestrians (simulated by hand waves or small objects) approaching the crosswalk. This will activate the system and determine whether to allow or warn pedestrians.
- **Red Light (System Idle):** The system remains in an “off” or red state when no pedestrian is detected.
- **Warning Sound:** If both pedestrians and traffic are detected simultaneously, the system should play a warning sound to alert the pedestrian not to cross.
- **Green Light (Safe to Cross):** If there is no traffic and a pedestrian is detected, the system should display a green light, signaling safe crossing.
- **Auto-Dim Mode:** If no pedestrians are detected for 10 seconds, the system should dim or turn off the light to save power.

Materials:

- Arduino Kit
- Cardboard
- Foam
- Battery Case (1x)
- Velcro Strips (6x)
- Tape

Submission Materials:

- Submit the designed prototype of the project within the given design timeframe.
- The prototype will go through a testing stage to determine its effectiveness in increasing safety and reliability on public transit.
- The source code, libraries, dependencies, and any additional files into a compressed folder, such as a ZIP or RAR archive.
- Although the focus of the presenting aspect is on the functionality and design choices incorporated into the device, participants may utilize visuals to support their ideas as long as they are submitted before the deadline.
- Presentation and accompanying slides are essential components of the evaluation day. **Submit the ZIP folder containing code files to the following email: MEC.chair@mues.ca by 8 pm. Presentation slides must be submitted via the Senior Design submission folder by 8 am.**

Please keep in mind the goal of this project and try to not stray from it. Look through the rules and guidelines carefully and make sure to follow them.

PROJECT		/70
Functionality	<ul style="list-style-type: none"> • Accurately detects pedestrians (e.g., hand waves or objects) within the designated range. /7 • Correctly detects traffic (simulated objects) near the crosswalk. /8 • Activates the warning sound when both traffic and pedestrians are detected simultaneously. /7 • Prevents the green light from displaying during unsafe conditions. /8 • Displays a green light when pedestrians are detected and no traffic is present. /8 • Smoothly transitions between states (red, green, and dimmed). /7 	/45
Energy Efficiency and Auto-Dim Mode	<ul style="list-style-type: none"> • Light dims or turns off accurately after 10 seconds of inactivity. /5 • Resumes normal operation quickly when a pedestrian or traffic is detected. /5 • Low-power features conserve energy effectively during inactivity. /5 • Reliable implementation of dimming or turning off the light. /5 	/20
Prototype Quality and Design	<ul style="list-style-type: none"> • Prototype is stable, neatly assembled, and securely mounted. /3 • Sensors are positioned effectively to detect pedestrians and traffic without interference. /2 	/5
PRESENTATION		/30
Visual Aids		/5
Design Process, Justification and Critique		/10
Voice, Articulation and Timing		/10
Response to Questions		/5
TOTAL		/100

Point Penalties	
Plagiarism	Elimination
Insufficient citation	-50
Documents received after deadline	-50
Absent team member	-25
Entering presentation room before allotted time (after first offense)	-10
Design is based off of an impossible concept	-50
Design makes no attempt to solve the problem within the constraints of the problem statement	-50
Total	