

## Detection of Individuals Not Using Designated Walkways



The motivation behind this project is to enhance workplace safety by ensuring that employees adhere to designated walkways in various industrial environments. Unauthorized movement outside of these safe paths can pose significant risks to health and safety. This project aims to prevent such unsafe practices with an automated system.

The project aims to detect instances where individuals are not using the designated walkways within any given facility. This project employs image processing to accurately identify when someone steps outside the designated safe paths. Upon detection, the system will alert the individual with a loud sound or a visual signal. Additionally, the system will log each incident for review by authorized personnel. The details of the system are as follows:

- An image processing and analysis system must be implemented to detect whether individuals are present outside the marked walkways.
- Upon detecting an incident, the system should trigger a loud sound or a prominent visual alert to warn the individual.
- The system should track individuals stepping outside the walkway and log each incident, including the time duration, recorded images or video, and the specific walkway involved. These logs must be accessible through an interface by authorized personnel.
- As part of the project, a mobile application should be designed, and the system should send real-time alerts to the mobile app when incidents are detected and offer the ability to inspect the associated log.
- A quick setup and calibration mode must be developed to prepare or adapt the system to different environments, such as varying walkway markings and widths, lighting conditions etc.
- The system should support multiple cameras in order to cover areas that cannot be monitored by a single camera.

- Required computing tasks can be performed on an edge device or in the cloud. If cloud computing is chosen, the server should be located remotely, with the edge device and camera transmitting video data with a wireless connection (Wifi, GSM etc.) rather than through a direct cable connection.
- The system should be designed to be adaptable to different environments and scalable to monitor large areas. It must demonstrate effective performance in at least two specific environments:
  - An indoor hall consisting of at least two interconnected corridors, each at least 30 meters long (such as the corridor on the underground level of Building D in our department).
  - An outdoor rectangular area with a minimum length of 100 meters on its shorter side (such as the department parking lot).
  - Effective performance is defined as achieving a meaningful Area Under the Curve (AUC) score for the True Positive Rate (TPR) vs. False Positive Rate (FPR) curve in a relevant scenario for both of the environments mentioned above.