Technical Report: auFaceCount

1. Introduction and Purpose

The purpose of this report is to document and analyze the difference in exposure and face count between a mobile robot with screens (Gallery robot) and stationary screens. The project is motivated by the desire to quantify how much more attention and interaction a mobile device can generate compared to a static installation.

2. Background and Motivation

The Gallery robot from a-units.com is a mobile platform with two screens that moves through public spaces displaying content. It is designed to attract attention and create interaction. To document its effectiveness, a software application, auFaceCount, has been developed that uses AI-based facial recognition to count people looking at the screen.

3. System Architecture

The following figure shows the system architecture for auFaceCount™:

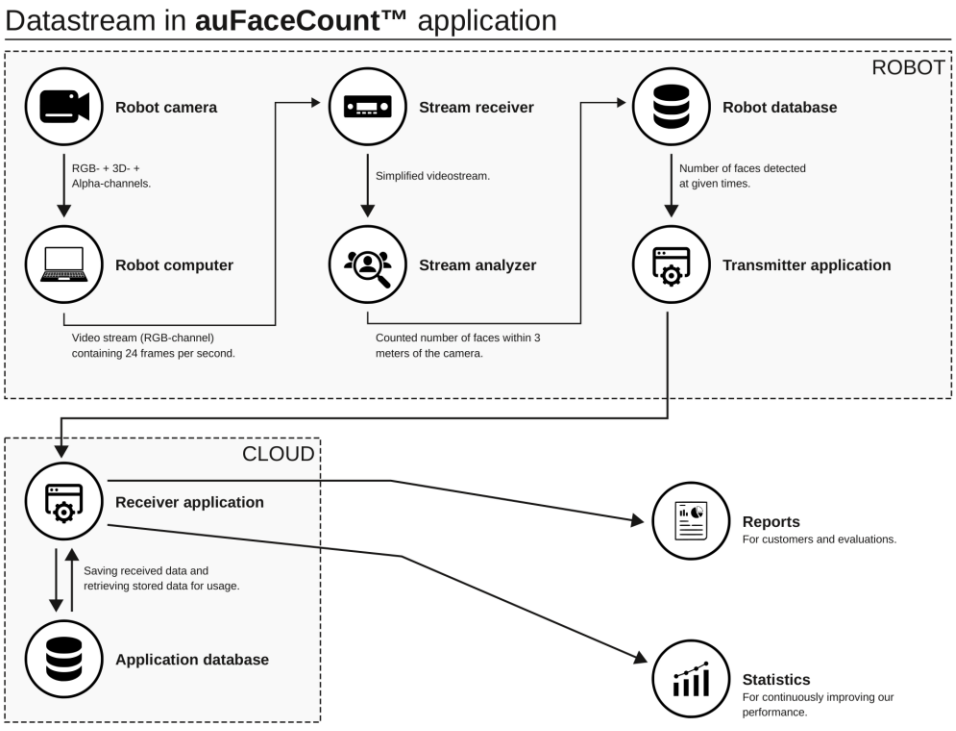

Figure 1: System Architecture for auFaceCount™ – data flow from robot to cloud.

The system consists of the following components:

Robot side (local system):
- Robot camera: RGB + 3D + Alpha channels, 24 fps video stream
- Stream analyzer: Detects and counts faces within 3 meters
- Robot database: Temporary storage of counts
- Transmitter: Sends simplified data stream to cloud

Cloud side (central system):
- Receiver application: Receives data stream from the robot
- Application database: Stores and organizes data
- Reports and statistics: Generates analyses for customers and evaluation

4. Functionality

The auFaceCount application detects and counts people who:
- Are located between 0.2 and 3 meters from the camera
- Have their face directed toward the screen for at least 2 seconds
- Have at least one eye, one eyebrow, and a nose visible
- Are within an angle of approximately 45° relative to the camera

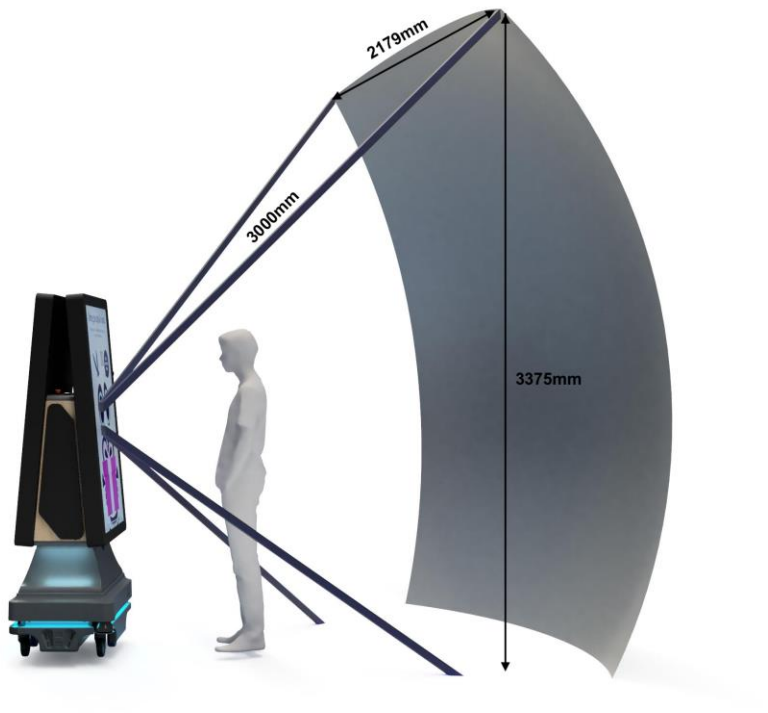

Figure 2: auFaceCount™ – field of view and distance thresholds for facial recognition.

5. Testing and Validation

Camera and system testing shows:
- Max number of faces in the frame: 15
- Distance (min–max): 20 cm – 3 meters (occasionally up to 3.5 m)
- Max recognition speed: 0.5 m/s
- Minimum time in frame: 2 seconds
- Max recognition angle: approx. 45°

Application test: Two identical robots were used – one mobile and one stationary (wrapped to hide mobility). Both displayed the same content and had identical hardware and software. The test was conducted in Rosengårdcentret over several days. Results show that the mobile Gallery robot achieves up to 5 times more exposures than a stationary screen under identical conditions.

6. Discussion

Motion is a strong visual stimulus, and when a screen moves through a space, it is noticed earlier and by more people than a stationary screen. This is due to:
- Movement attracts attention
- People see the robot before they are within the camera's field of view
- More people turn and follow the robot with their gaze

Although auFaceCount only counts people within 0.2–3 meters and with direct gaze, it can be assumed that at least twice as many actually see the screen – but without being registered. This means that the actual exposure is significantly higher than the measured count.

Conservative estimate:
- auFaceCount ratio (measured): 4.95
- Assumed visibility outside field of view: ×2
- Actual exposure: ~10 times higher than stationary screens

Supporting research:

- Short-form video & attention:
https://www.researchgate.net/publication/366031047_The_effect_of_short-form_video_addiction_on_users'_attention

7. Appendices

The following appendices are attached to the report:

- au_facecounter_flowchart_v1.1.pdf

- camera one-pager.docx

- counting views test.xlsx

- Validation.xlsx