



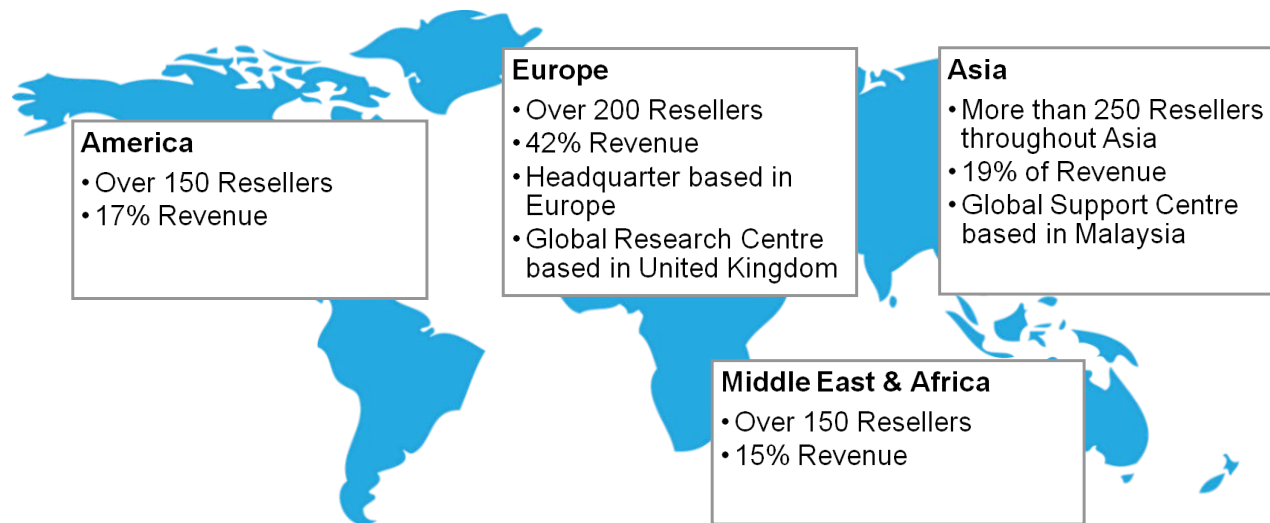
# FootfallCam Smart Bus Solution

Passenger counting for bus service planning

# About FootfallCam™

## Global Leader in People Counting System

- Headquartered in the United Kingdom
- Manufacturer of both hardware and software; design and development are 100% in-house made.



- Reinvest more than 24% revenue into research and development
- **In-house R&D team** dedicated to hardware & software development
- Combined **over 100 years industry experiences** in developing people counting solution
- **Serving multiple sectors** varying from retail, fast food, restaurants, museums to smart buildings and airports.

# Topics of This Webinar:

- FootfallCam Smart Bus Solution – Overview
- Why passenger counting for bus operators?
- What are the key features?
- System Design & Architecture
- Case Studies
- Enterprise Class Software

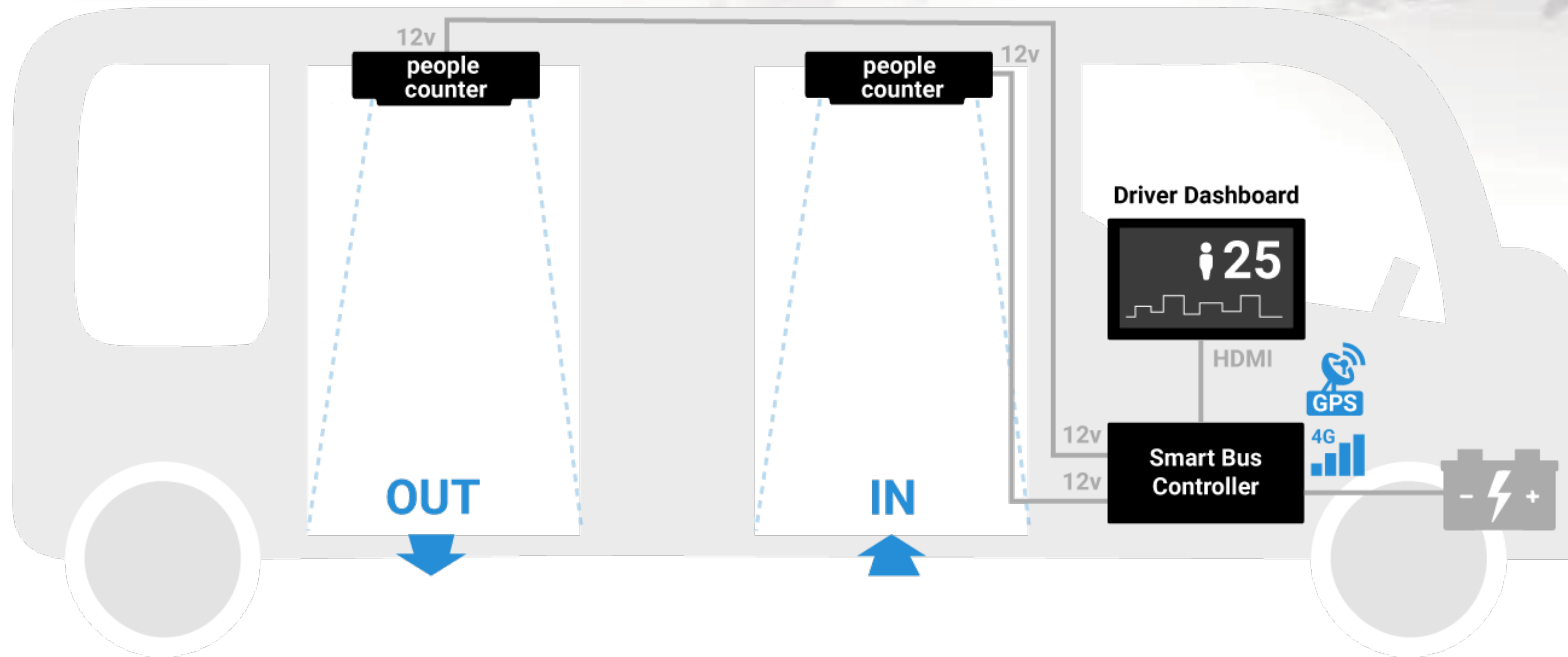
## About Speaker

**DR. MELISSA KAO** *BSc (Hons), PhD*

Director of International Sales, FootfallCam UK Limited.

[Connect on LinkedIn](#)

# FootfallCam Passenger Counting System

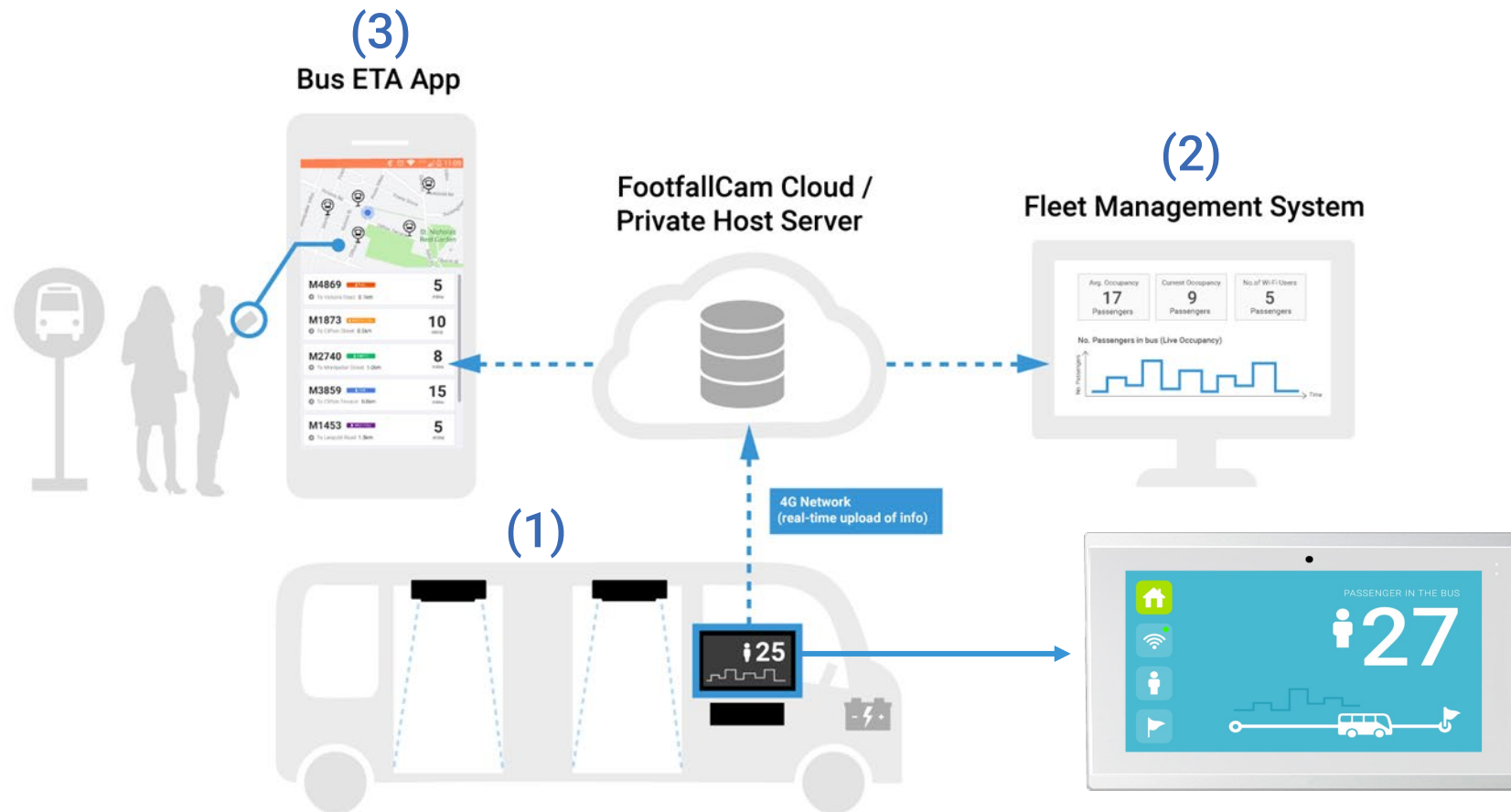


## How it Works?

- **Count** passengers going **IN & OUT** of the bus
- Display live occupancy on the driver dashboard
- Built-in GPS and 4G network
  - Measure bus occupancy at **different locations at different timestamps**



# FootfallCam Smart Bus Solution - Overview

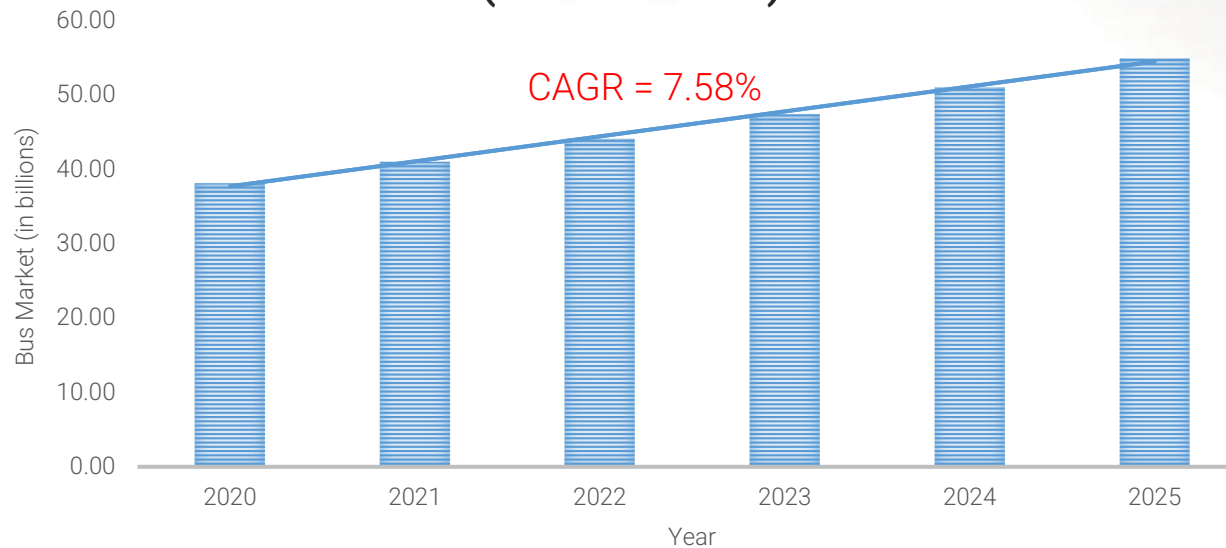


1. Count the **Occupancy of Bus** in real time
2. Upload the Occupancy Data into your **Fleet Management System**
3. Show Passengers Bus Occupancy Level on your **Bus ETA App**

# Why Passenger Counting for Bus Operators?

# Potential Market for Buses

## PROJECTED GLOBAL BUS MARKET (2020-2025)



- According to Bloomberg New Energy Finance, around **3 million city buses** were in operation worldwide as of 2017 [1]
- Global bus market is projected to reach **\$ 54.92 billion by 2025** with a Compound Annual Growth Rate (CAGR) of 7.58% due to improvements in infrastructure & increasing population [2]
- In view of the recent trend of Intelligent Transportation System (ITS), bus companies are looking for ways to better **control and manage its transport system** [3]
- Passenger IN/OUT count data can be utilized to make informed business decisions:
  - E.g. Effective route planning
  - E.g. Optimize allocation of resources
- This creates a **growing need** for the implementation of people counters in buses

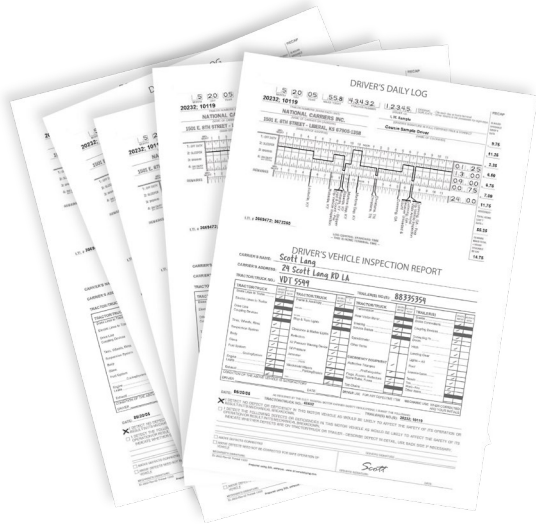
Sources:

[1] <https://www.sustainable-bus.com/electric-bus/electric-bus-public-transport-main-fleets-projects-around-world/>

[2] <https://www.mordorintelligence.com/industry-reports/bus-market>

[3] [https://www.researchgate.net/publication/279277478\\_Recent\\_trends\\_in\\_intelligent\\_transportation\\_systems\\_a\\_review](https://www.researchgate.net/publication/279277478_Recent_trends_in_intelligent_transportation_systems_a_review)

# Pain points for Bus Operations Management



**Traditional** bus driver logbook

A screenshot of an Excel spreadsheet titled 'Bus Route Planner'. It contains a table with columns for Date, Time, Bus, Route, and Bus Driver. The data shows a schedule for various bus routes over a period of several days.

Date	Time	Bus	Route	Bus Driver
16/07/2020	10:20:36AM	M7859	Avenue Road	John
16/07/2020	2:48:15PM	M5825	Dendris Road	David
16/07/2020	5:15:20PM	M1462	Stanhope Road	John
17/07/2020	8:30:00AM	M8971	Avenue Road	Edward
17/07/2020	9:42:30AM	M3350	Archway Road	Mavis
17/07/2020	1:28:20PM	M9461	Stanhope Road	David
17/07/2020	3:30:50PM	M7859	Avenue Road	John
18/07/2020	6:42:30AM	M5825	Dendris Road	John
18/07/2020	1:28:20PM	M1462	Stanhope Road	David
18/07/2020	3:50:10PM	M8971	Avenue Road	John
18/07/2020	4:30:30PM	M3350	Archway Road	Edward
18/07/2020	6:12:25PM	M9461	Stanhope Road	Mavis
19/07/2020	9:53:30AM	M1462	Avenue Road	David

**Manual** planning on Excel

**Bus Route Planner**

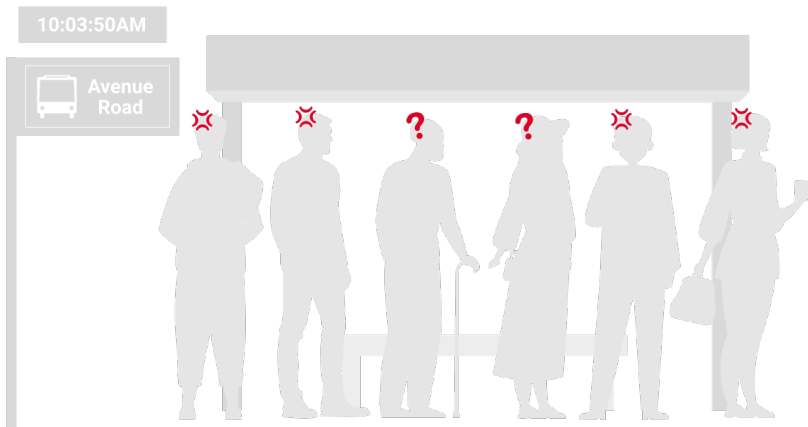
Date	Time	Bus	Route	Bus Driver
16/07/2020	10:20:36AM	M7859	Avenue Road	John
16/07/2020	2:48:15PM	M5825	Dendris Road	David
16/07/2020	5:15:20PM	M1462	Stanhope Road	John
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18/07/2020	3:50:10PM	M8971	Avenue Road	John
18/07/2020	4:30:30PM	M3350	Archway Road	Edward
18/07/2020	6:12:25PM	M9461	Stanhope Road	Mavis
19/07/2020	9:53:30AM	M1462	Avenue Road	David
16/07/2020	11:48:50AM	M7859	Dendris Road	John

**Printed Bus Schedule** for driver

## Key Concerns:

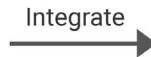
**Lack of concrete data** to make informed business decisions

- What is the arrival time at each bus stop?
- What is the utilization rate of bus routes?
- What is the occupancy of bus at different periods?
- At which point of the route to passengers enter/exit the bus?
- Can the frequency of bus rides cope with the demand?
- How effective is the bus route planning?





# How would people-counting help?



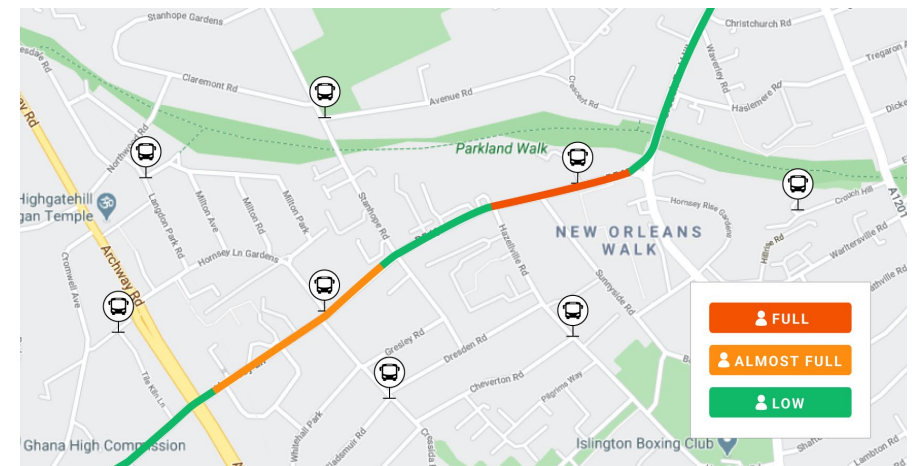
- **GPS** locations
- Live bus tracker with **4G network**
- **Occupancy** at each bus stop of the route

## Key Results:

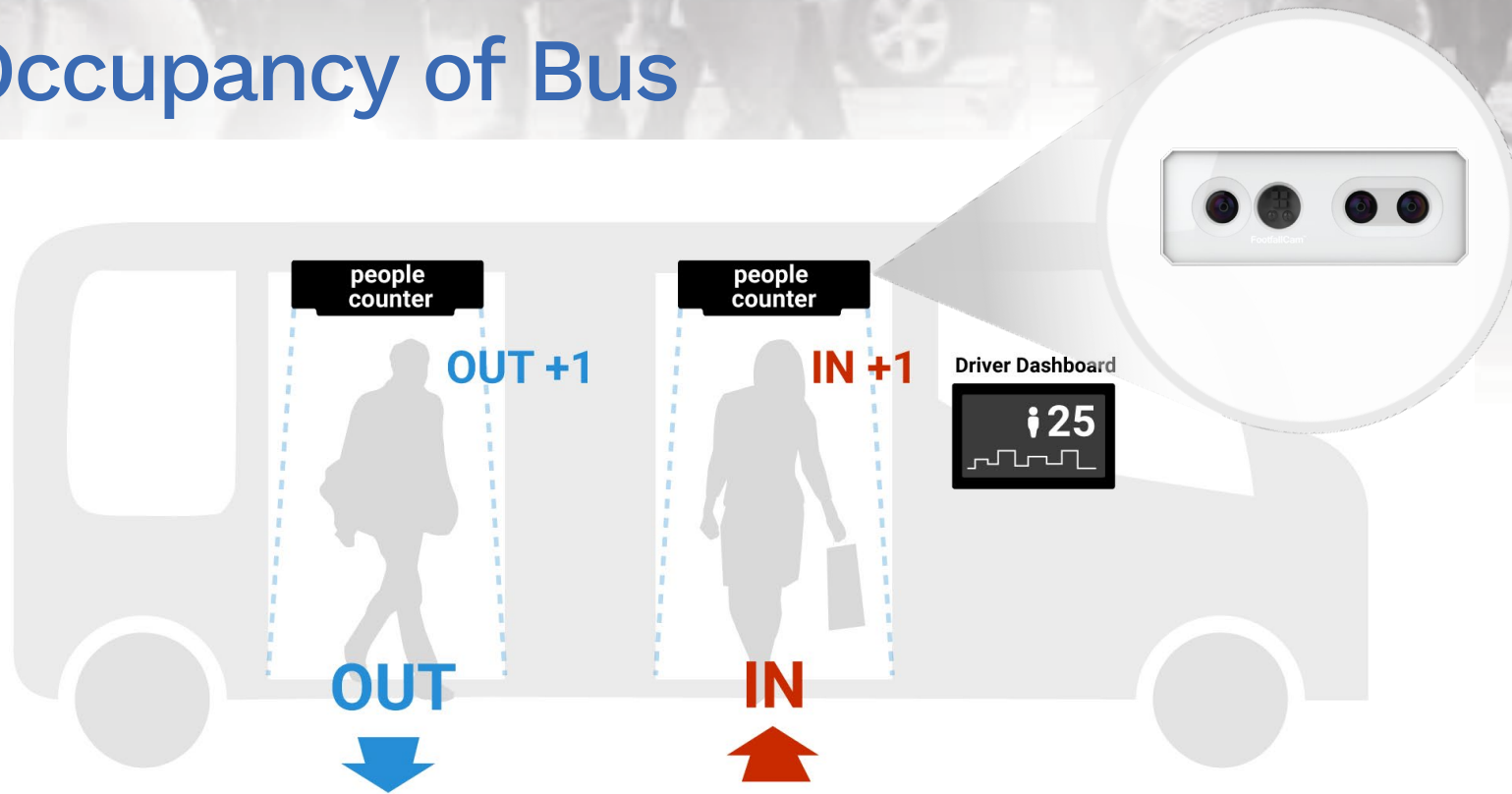
- Visibility on **real-time occupancy**
- **Maximize** the **utilization** of each bus
- Reduce cost by having **effective bus route planning**
- Enhance passenger experience

# Key Features for Smart Bus Solution

- Live Occupancy of Bus
- Integrate with your Fleet Management System
- Integrate with your Bus ETA App
- Occupancy Dashboard for Bus Control Centre
- Occupancy Reports for Management



# Live Occupancy of Bus



## Accurate Passenger Counting

- **Measuring live occupancy** of the bus via people counters
  - Above **95% accuracy** with 3D stereoscopic video technology
  - Automatically stop counting when doors are closed for **noise prevention** using [GPIO](#) function
  - Wide coverage at **low entrance height**
- Monitor bus load through Driver Dashboard
  - **Alert** when overcrowded

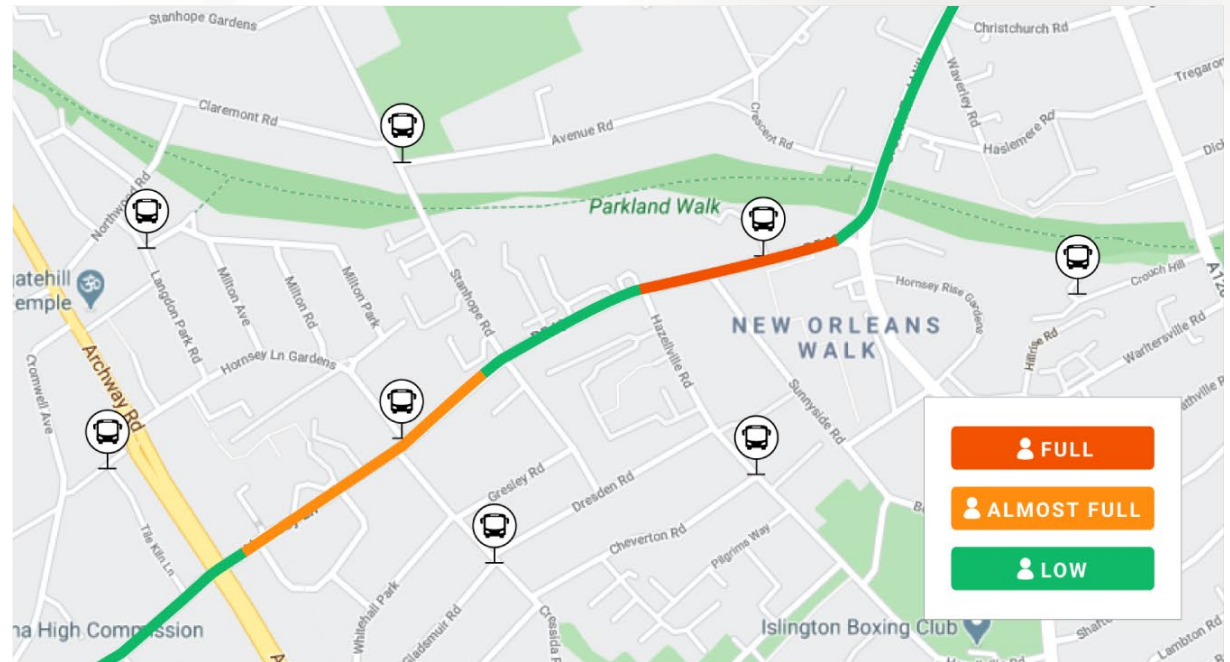
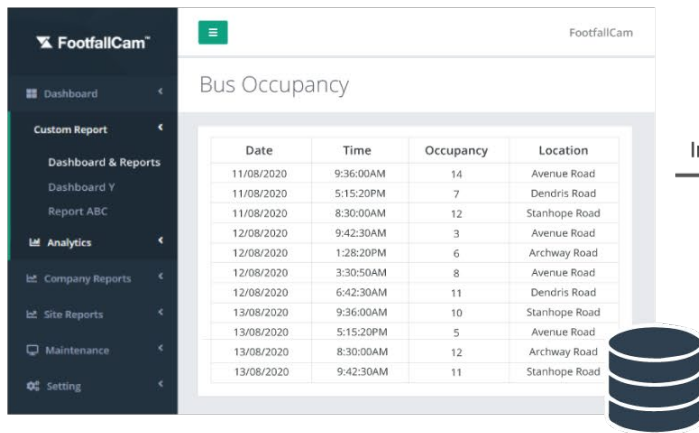


Watch how it works:

<https://www.youtube.com/watch?v=IC90vfFe3P0>

# Integrate with Your Fleet Management System

## People Counting Data with GPS Location

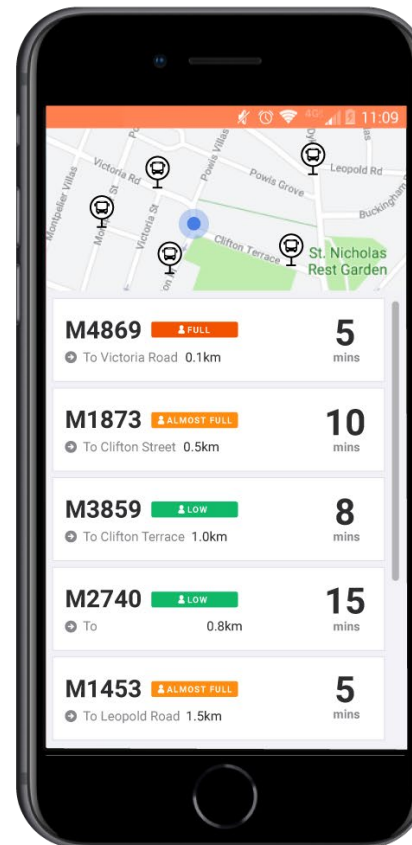


- Input occupancy data into your system through [API](#)
- Know bus occupancy over **different timings at different locations**
- Identify key trends and make informed decisions:
  - **E.g. Optimize Route Planning** by knowing which part of the route is busy or under-utilized
  - **E.g. Optimize Allocation of Resources** by knowing when are the peak periods

# Integrate with your Bus ETA App

## Display Bus Occupancy Level at your Bus App

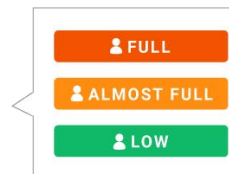
- Passengers can have **easy access to the Occupancy Level** for each bus:
  - Full
  - Almost Full
  - Low
- Help passengers to **pre-plan their journey** better
- Better **manage passengers' expectation** on number of empty seats, thereby improving customer's experience



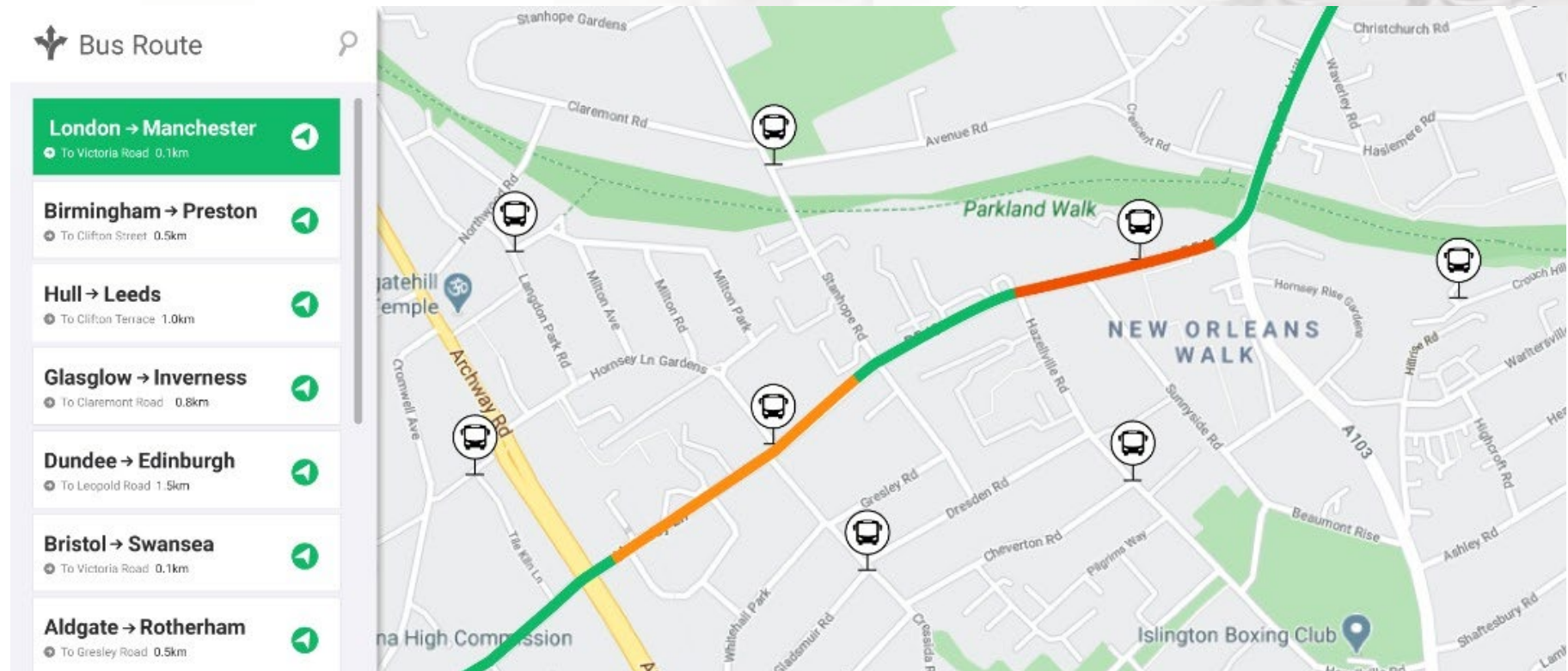
## People Counting Data with GPS Location

Date	Time	Occupancy	Location
11/08/2020	9:36:00AM	14	Avenue Road
11/08/2020	5:15:20PM	7	Dendris Road
11/08/2020	8:30:00AM	12	Stanhope Road
12/08/2020	9:42:30AM	3	Avenue Road
12/08/2020	1:28:20PM	6	Archway Road
12/08/2020	3:30:50AM	8	Avenue Road
12/08/2020	6:42:30AM	11	Dendris Road
13/08/2020	9:36:00AM	10	Stanhope Road
13/08/2020	5:15:20PM	5	Avenue Road
13/08/2020	8:30:00AM	12	Archway Road
13/08/2020	9:42:30AM	11	Stanhope Road

Integrate



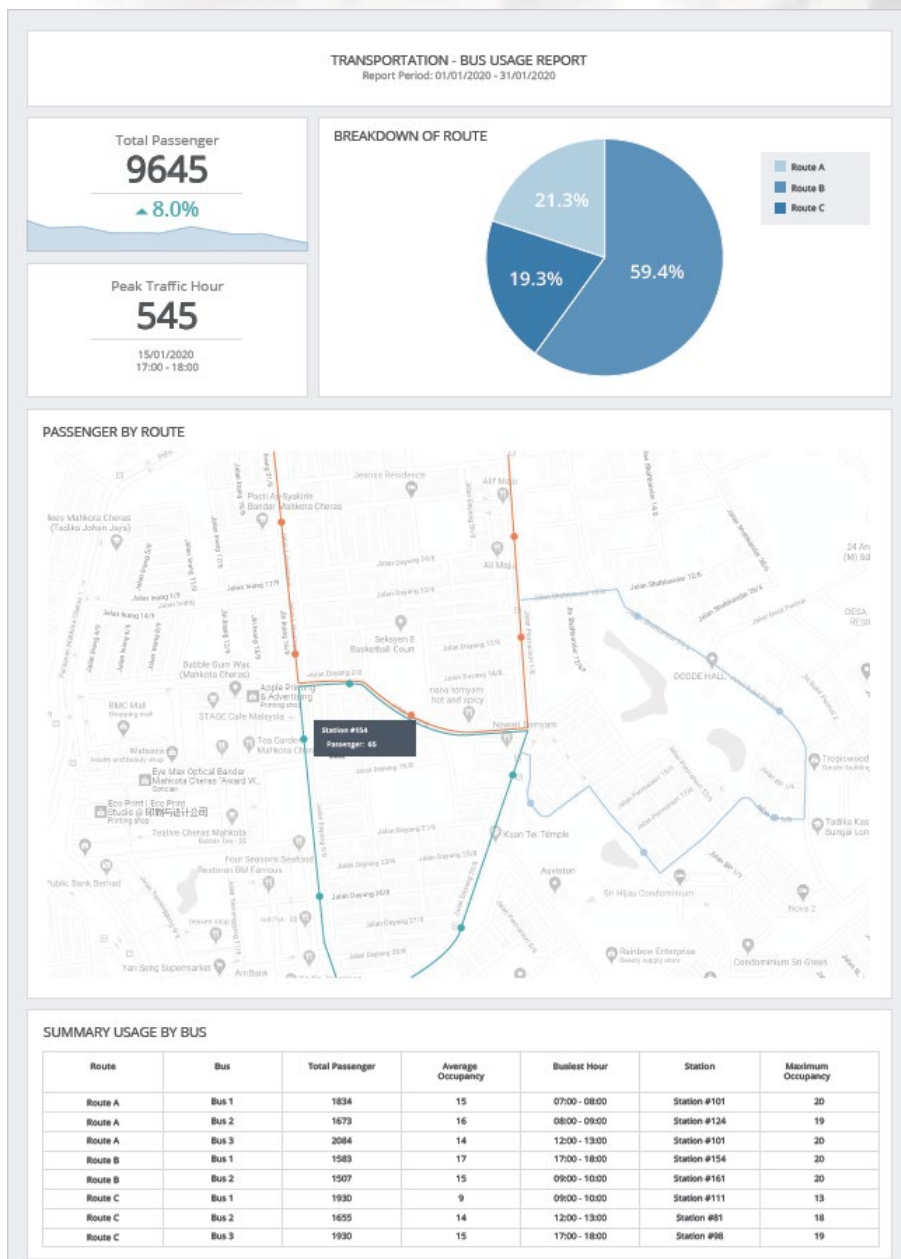
# Occupancy Dashboard for Bus Control Centre



## Monitor Live Occupancy of Buses

- **Receive alert** when routes are over-utilized
- Bus operator can assign more buses to highly-occupied routes
- Ensure frequency of bus rides can **cope with real-time passenger demand**

# Occupancy Reports for Management



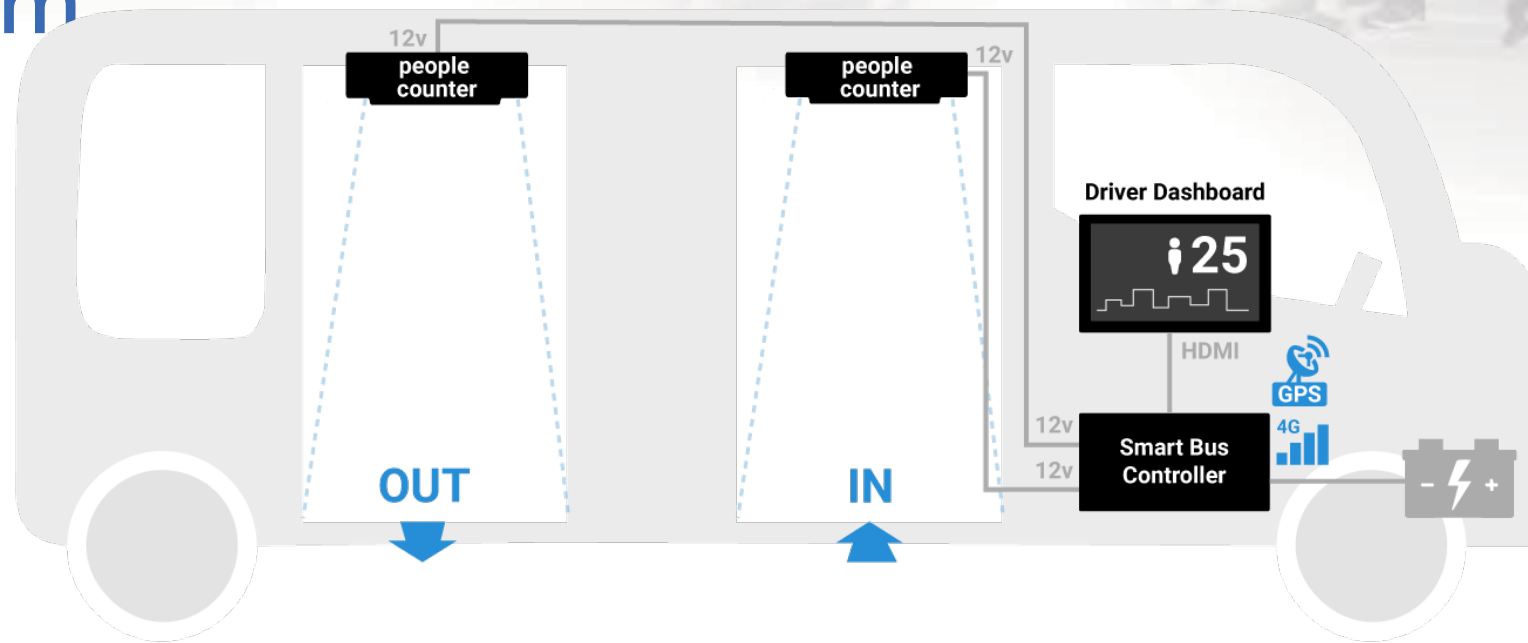
## Keep track of occupancy trend:

- Clear insight into occupancy trend based on historical data
- Management can view the occupancy reports on
  - Company-level
  - Route-level
  - Bus-level

View Bus Occupancy Report [HERE](#)

# System Design and Architecture

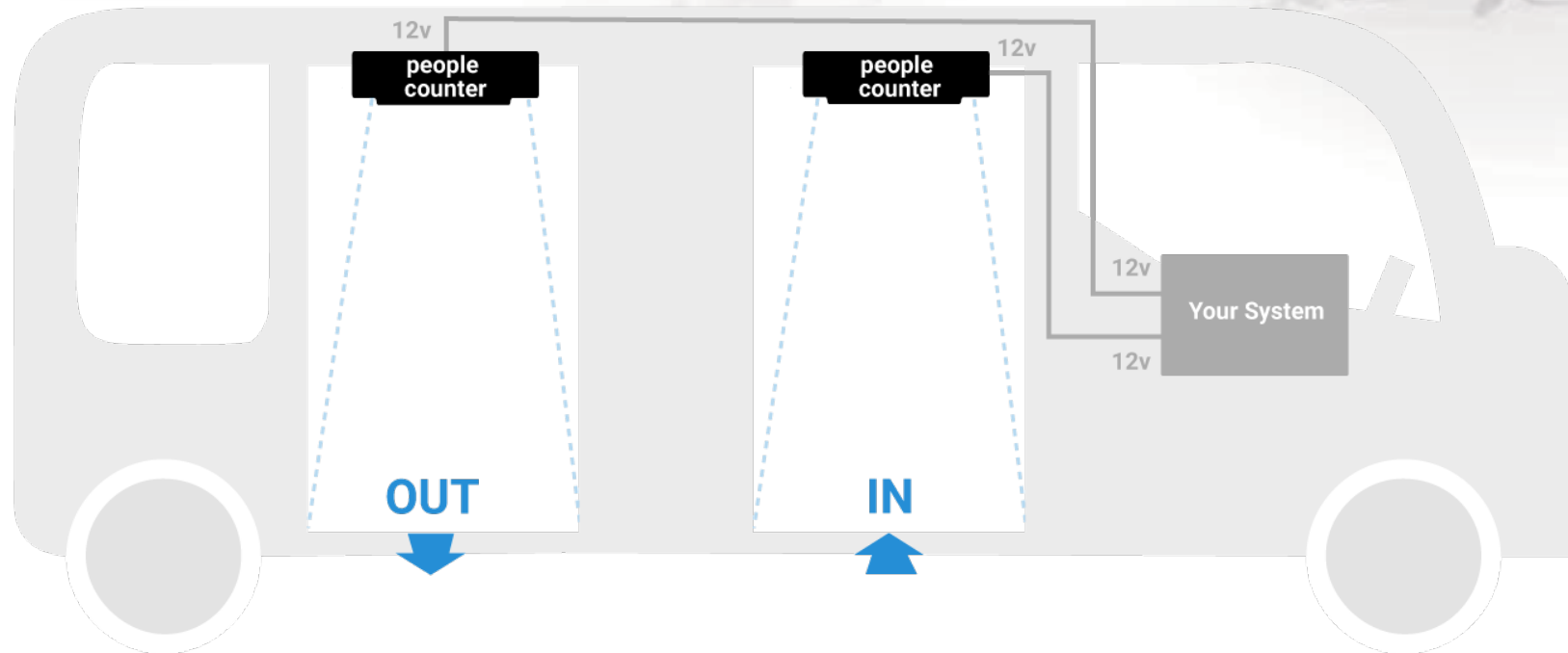
# Option #1: Smart Bus Solution – Complete System



## System Components

1. People counters
  - **Counting** people coming **in and out** of the bus
2. Smart Bus Controller
  - Connected to vehicle's battery, which **powers** the whole system
  - Provides **network** connectivity
  - Built-in **GPS** to track the location of bus
3. Driver Dashboard – Displaying the **live occupancy data**

# Option #2: People Counting Only System



## Work with any of your existing system

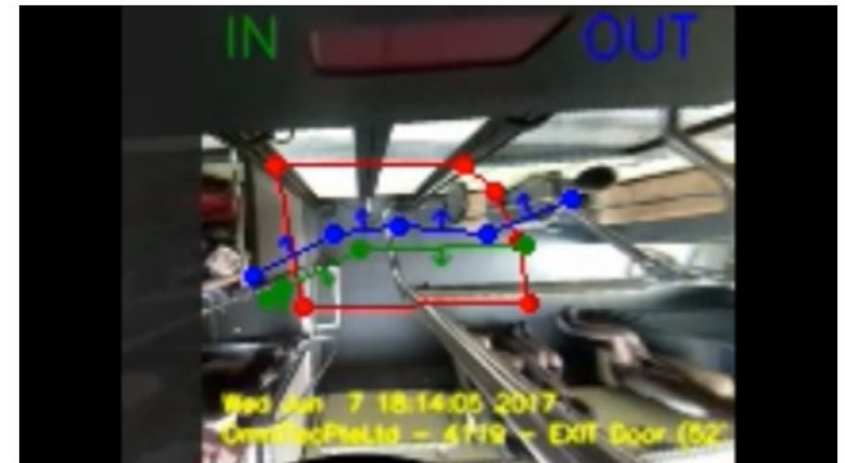
- **Integrate** our people counters to your **own existing system**
- Upload Bus Occupancy data to your system for extra business insights

# Case Studies

# #1 Tourist Bus - Sentosa Bus Services, Singapore



- Sentosa Bus Services wanted to **measure the number of tourists** travelling between **different attractions** within Sentosa
- FootfallCam **integrated** our people counters to **their own server system**
  - Bus occupancy at different parts of the route over time was measured
- They used Footfall Data to
  - Optimize route planning & day to day scheduling for tourists



Youtube Link: <https://youtu.be/gB4yj8FZLe4>

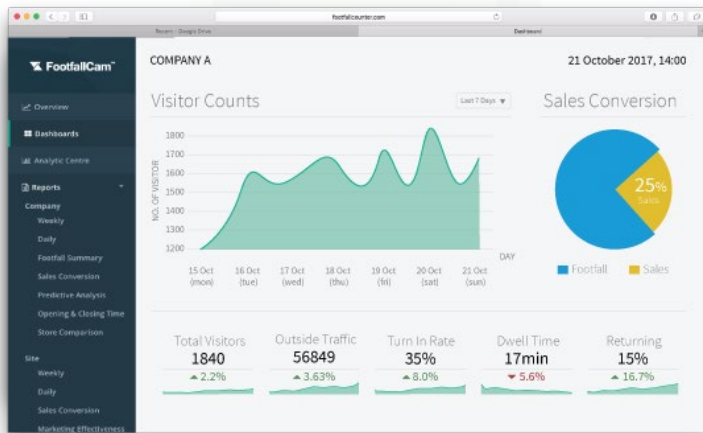
## #2 Public Bus – HEMC-Tech, Poland

- Reseller approached us to **develop a people counting system** for bus service providers
- FootfallCam provided people counters specially designed for **low ceiling height**
- Tablet display for drivers to monitor bus load
- Bus operators used Footfall Data to:
  - **Forecast Peak Periods** & Optimize Allocation of Buses
  - **Justify Government Funding**



# Enterprise Class Software

# FootfallCam Analytic Manager V8™



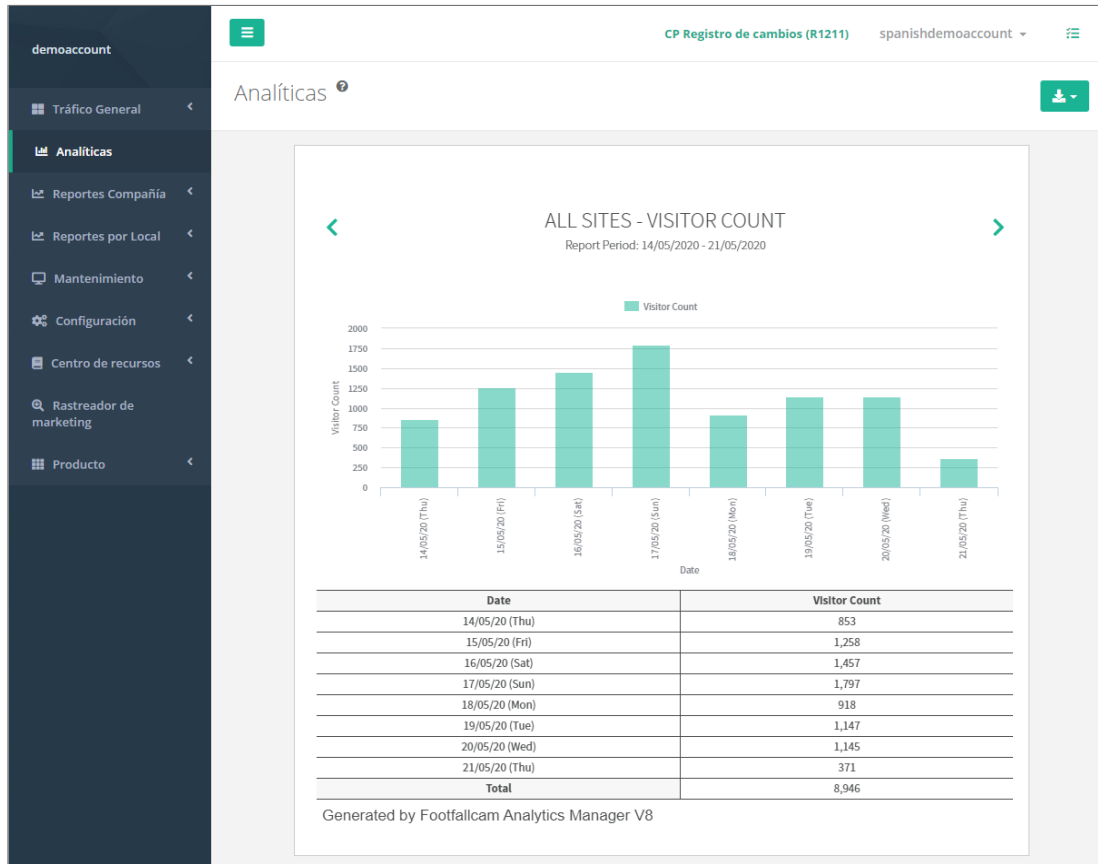
## Functions:

- Staff alert if capacity limit is breached
- Centralized Management Analytics Software
- API Available for Data Integration
- Pre-defined Report Set
- Health Check Report
- User Account Management
- Automated Email Scheduler

## Software Specifications

Interface	Http; Https
Compatible Browser	IE7 or Later Mozilla Firefox or Later Chrome Version 4.0 or Later Safari
User Levels	2 levels: Administrator, Standard User
Ethernet	10/100 Mb Ethernet
Time	NTP, Adjustable time zone, automatic day light saving adjustments
Data Delivery	TCP/IP
Database Type	SQLite
Report format	csv, .xml, .txt
Data Storage	5 Years storage with auto sync
Data Backup	Yes
Backup Frequency	Daily Full Backup of Data and Configuration Weekly Backup to Sub Server for Contingency Purpose
Software Version Upgrade	Auto Upgrade

# #1: Enterprise Class Software



## Multi-language Interface

Different languages available such as:

- English
- Dutch
- Spanish
- French
- Italian
- German
- Arabic
- Japanese
- Chinese

## Customise dashboard design

- FootfallCam will customize the language and images in the dashboard
- Provide us with the translated text and graphics, then we will help you handle the configuration

## #2: Video Proof

### SAMPLE MALL ACCURACY CERTIFICATE

Counter Name : Counter 1  
Branch : Branch 1  
Verified Date : 21/08/2018  
Verified by : sengsiong

	In	Out
Manual Observation	119 (in)	138 (out)
System Count	116 (in)	135 (out)
Different	3	3
Accuracy	97.48 %	97.83 %

#### Summary

Following the concern from the sample mall regarding the accuracy of the footfall counter, we have performed a verification study. The system has achieved an overall accuracy of 97.48% with a sample size of 119 persons coming in; accuracy of 97.83% with a sample size of 138 persons going out. Therefore, we are happy to assure that the count figures are accurate.

#### Video Logs



Date & Time : 20.08.2018  
17:00:00 - 17:30:00  
Manual Observation : 45 (in) : 50 (out)  
System Count : 45 (in) : 50 (out)  
Different : 0 : 0



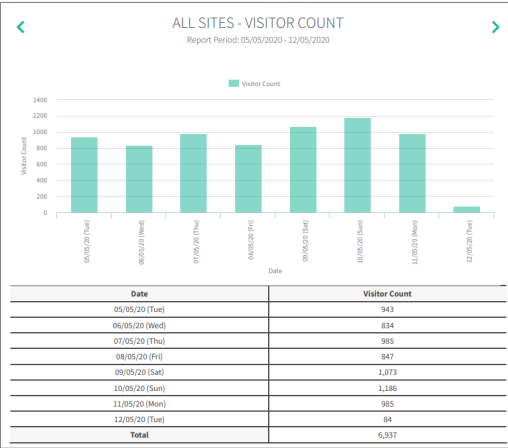
Date & Time : 20.08.2018  
18:00:00 - 18:30:00  
Manual Observation : 41 (in) : 47 (out)  
System Count : 40 (in) : 46 (out)  
Different : 1 : 1

## Ensure 95% and above data accuracy

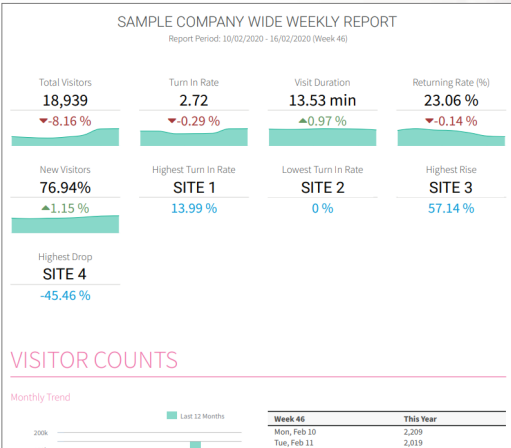
- After installation, FootfallCam's in-house verification specialist will remotely access the counter to perform accuracy audit
- They will schedule video recordings to collect a sample size of 20 and above
- After that, they will configure the counter to ensure that it is able to detect the visitors in the video recording
- Once it is completed, the team will generate an Accuracy Certificate which will showcase the counter accuracy and summarize their finding

[Sample Accuracy Audit Report](#)

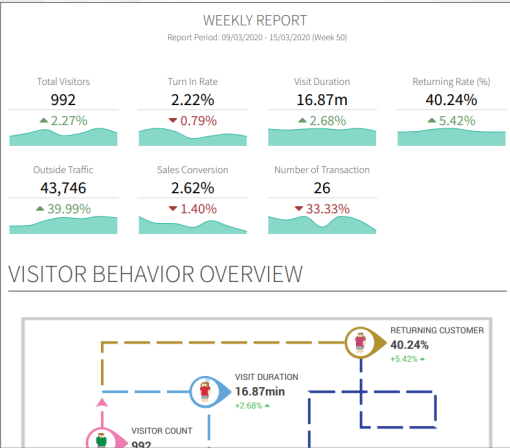
# Reporting Suite



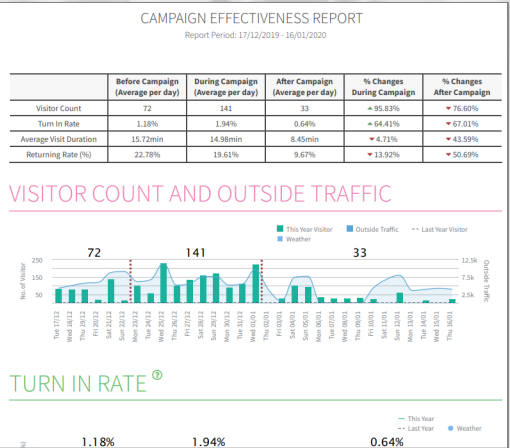
Analytics Center



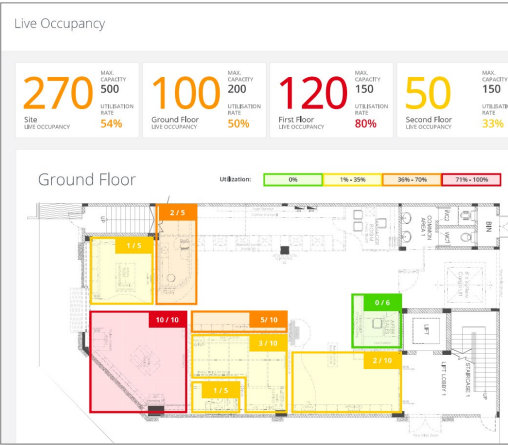
Company Weekly Report



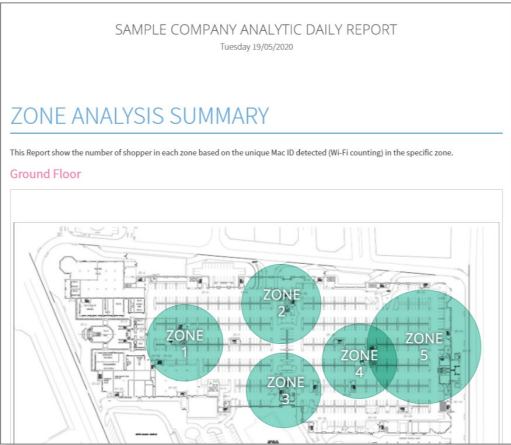
Site Weekly Report



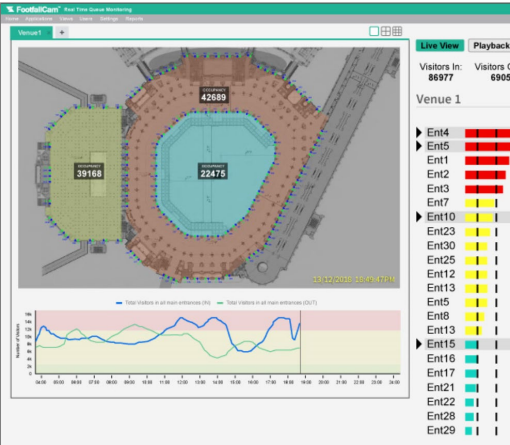
Marketing Effectiveness



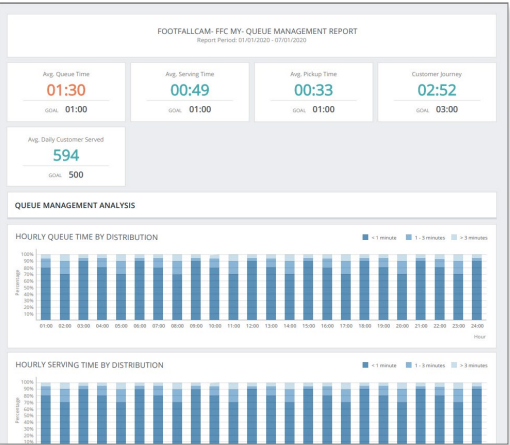
Live Occupancy



Zone Analytics



Mecca Occupancy



Queue Counting

# Management Control

User account

Users	Account type	Mail	Last access	Delete user
sampledemoaccount	admin	admin@exampleemail.com	05/20/2020 4:55:02	
IT Team	admin	it@exampleemail.com	01/01/1970 0:00:00	X
Site1	user	site1@exampleemail.com	01/01/1970 0:00:00	X

User Control

Counter Management

1. How to add counter?  
Counter Management > + Add Counter > Input serial > Add

2. How to change counter name?  
Counter Management > Details > Input Counter Name > Save

3. How to upgrade firmware?  
a. Counter Management > Details > Firmware Version > Upgrade  
b. Company Setting > Firmware Update > Input Number

4. What to do during counter relocation?  
Counter Management > Details > Delete Counter > Counter Management > + How to add counter? > Input serial

20 Latest Firmware: 3.2.12  
30 Latest Firmware: 3.2.3a

Company: Sample Company  
Total Site: 22 (step)  
Total Counter: 19 counter(s)

+ Add Site

Site 1 (1 counter(s))  
Counters: Counter 1 (000000007017766715F010226368) (3.2.3) - Verified  
+ Add Counter Settings Details

Site 2 (2 counter(s))  
Counters: Counter 2 (000000007017766715F010226369) (3.2.3) - Verified  
Counters: Counter 3 (000000007017766715F010226368) (3.2.3) - Verified  
+ Add Counter Settings Details

Site 3 (1 counter(s))  
Counters: Counter 4 (000000007017766715F010226377) (3.2.3) - Verified  
+ Add Counter Settings Details

Site 4 (1 counter(s))  
Counters: Counter 5 (000000007017766715F010226399) (3.2.3) - Verified  
+ Add Counter Settings Details

Site 5 (1 counter(s))  
Counters: Counter 6 (000000007017766715F010226430) (3.2.3) - Verified  
+ Add Counter Settings Details

Branch Control

Email Scheduler

User Groups

Create a group to receive scheduled email

1. Note:  
Maximum of 20 email per user group.

User Group Name	Email	Edit
IT GROUP	user-1@footfallcam.com user-2@footfallcam.com	Edit
Report Group	user-2@footfallcam.com user-2@footfallcam.com user-2@footfallcam.com	Edit
IT	user-3@footfallcam.com	Edit

Email Scheduler

Configure your report to specific user group, you may set the time of the report to be sent

1. Note:  
Data Aggregation happen at 4am daily, delay in data upload to server due to internet connection issue may cause the report data to be incomplete

Email Scheduler

Import

Import Setting

You may download the sample CSV file Sales Conversion template for references.

Manual Upload

Automate Upload

Data Configuration

Import Data Type Sales Data

Sales File Format FootfallCam format

Upload File

Required Fields

Site Code  
Date / Time  
Total Transaction Qty  
Total Transaction Value

Available Fields in CSV File 11  
No file is uploaded yet.

Import

Import/Export

# Health Check and Maintenance Tools

DATA INTEGRITY REPORT

Saturday 29/02/2020  
10:00 - 22:00

SITE LEVEL

Site Summary for the last 14 days

No. of Visitor (In)	No. of Visitor (Out)	Discrepancy (%)
2,534	2,479	2.17

Site Detail for the last 14 days

Date	No. of Visitor (In)	No. of Visitor (Out)	Discrepancy (%)
Sun 16/02	339	319	5.90
Mon 17/02	104	100	3.85
Tue 18/02	128	124	3.13
Wed 19/02	106	103	2.83
Thu 20/02	87	85	4.60
Fri 21/02	134	136	1.47
Sat 22/02	332	319	3.92
Sun 23/02	322	313	2.80
Mon 24/02	109	108	0.92
Tue 25/02	88	89	3.37
Wed 26/02	121	120	0.83
Thu 27/02	130	130	0.00
Fri 28/02	162	161	0.62
Sat 29/02	374	374	0.00

Site Summary for the last 120 days

1000  
800  
600

No. of Visitor (In) No. of Visitor (Out)

Data Integrity

Company Data Integrity Report

SAMPLE COMPANY'S Data Integrity Report  
12/05/2020

Company Level Summary

Data Availability: 18 / 18 Site  
19 / 19 Counter

Aggregate Data	OK	Accuracy Issue	Offline	0 Site
Non-aggregate Data			Offline	0 Site
		Tuning in Progress		0 Site

100 0%

OK Accuracy Issue Offline Tuning in Progress

Categories	Issues	No. of Counters	Responsible
Offline	Device is working	0	FootfallCam
	Network Issue	0	Customer
	Cable Issue	0	Customer
	Device Cannot Boot Up	0	Customer
	Not in Use	0	-
	No Light	0	Customer
	Pending Customer Feedback	0	Customer
	Customer To Resolve	0	Customer
	Site Visit Required	0	Customer
	RFID Inactivation	0	FootfallCam

Company Data Integrity

Issue Tracker

1. Fill in the LED light color in the select box after you have checked on the counter  
Follow the Counter Checking Form to diagnose the counter issue  
Row indicated with red color = Offline site / counter  
Row indicated with blue color = FootfallCam to Action  
Row indicated with yellow color = Customer to Action

19 counter(s) found

Company: Sample Company  
Total Sales: 18 site(s)  
Total Counter: 19 counter(s)  
Total Offline: 0 counter(s)

Server Address: http://footfallcounter.com  
Total Unverified: 0 counter(s)  
Scheduled Report Sent Status: 1/1  
Total Issue Raised: FootfallCam to Action - Customer to Action

Site Name: Site 1 | Site Code: FFM  
Total Counters: 1 | Site verified

Site Configuration | Data Integrity

Customer Feedback

FootfallCam Feedback

Counter

System Message

Action

Site 1

Counter / Environment Constraint(s)

View Report

Site Name: Site 2 | Site Code: FFM  
Total Counters: 2 | Site verified

Site Configuration | Data Integrity

Issue Tracker

Trouble Tickets

FootfallCam Trouble Ticket

No ticket found

Support Portal

FootfallCam

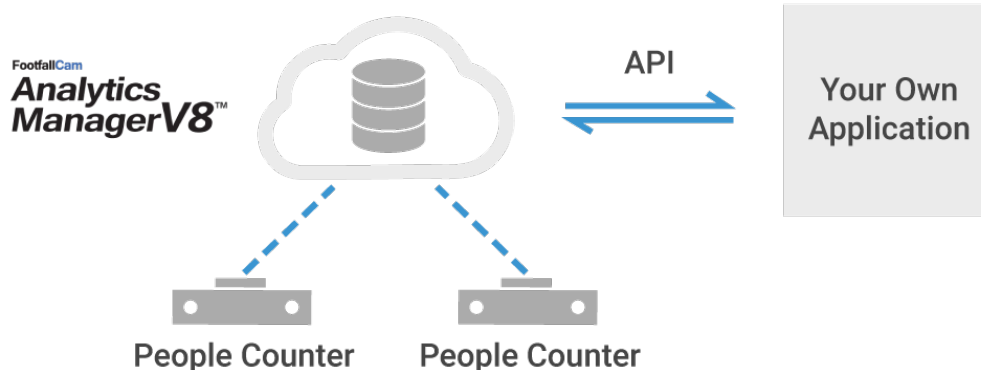
# API: Integrate with your Applications

## Option 1: API directly from the counter



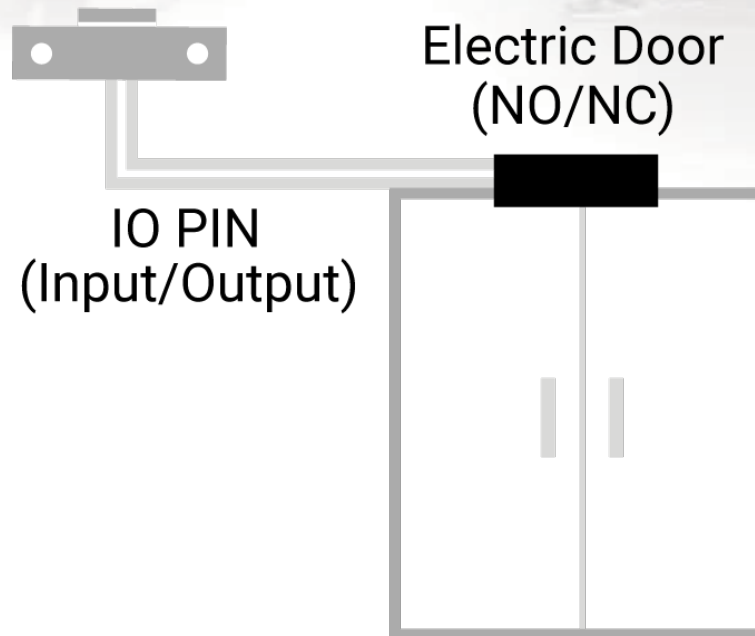
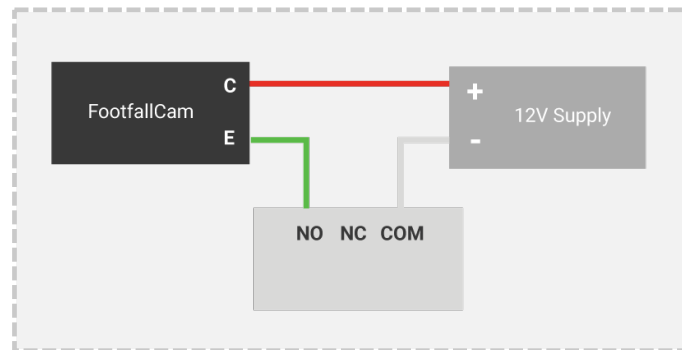
The XML-based interface allows people counting data to be integrated into third-party software platform via API or data push features. The people counting system combined with the customer's own data to give valuable insights such as performance KPIs & etc.

## Option 2: API through the server



- Allow you to **integrate your data** with other source
- **Real-time** data retrieval
- Data in aggregated or raw format
- The data will be packed into a convenient JSON/XML data
- Other Methods available through the API:
  - FTP
  - Automated E-Mail
  - Manual
  - FTP

# Using IO Pin to Regulate Counting



## Integrate occupancy counting with all entrances and exits

- Read CAN bus data through **GPIO Integration**
- The system **starts counting** when the door is **opened**
- People counter will **automatically stop counting** when door is **closed** to prevent noise.
- FootfallCam 3D Pro comes with NO/NC port
  - IO pins are available for clients to integrate with their bus doors

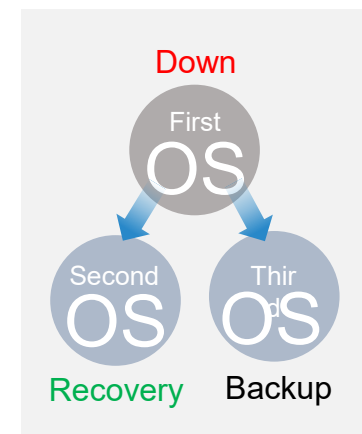
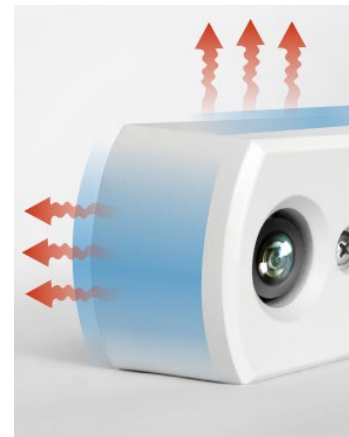
# Hardware: FootfallCam 3D Pro2™



Key Specifications	
Model	FootfallCam 3D Pro2™
Device Dimension	153.7mm x 58.2mm x 39.5mm (WxDxH)
Weight	400g
Cameras	2x 5MP resolutions
	Lens: 160°
Mounting Height	2.1 metres - 5metres
Casing	Aluminum oxide alloy, waterproof and dust resistant. 1mm tempered glass lens-covering.
Power	Power over Ethernet: 48VDC (Max 30W)
Tracking Technology	3D- Spacing Mapping Video tracking technology, Background removal on static objects

## Features:

- Real-time occupancy counting
- Bi-directional counting with **95% and above accuracy**
- Designed for **Low Ceiling Height** and **Widest Coverage**
- IP65 - suitable for outdoor use



# Q&A Session

## Contact Us

You need further information or have a question?  
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