



LIBRARY PEOPLE COUNTER

EVERY FACE COUNTS

The Ndende Intelligent Facial Recognition Library Solution Specifically Designed for South African Libraries



NdCount System Technical Specification

NdCount Solution Description

NdCount® People counting solution is a modular and flexible system designed specifically for South African Library Markets powered by a market-leading Facial Recognition Engine. With NdCount, every face is a unique record and gets counted as one person, if a person were to enter a library several times a day, that person would only be counted once. In addition to the number of visitors, the system provides Gender classification, Age estimation, and Ethnicity (in broad definition) classification are computed and provided by the Facial Recognition Engine.

NdCount Solution architecture comprises two main components, a back-end data repository with a Management portal and an edge computing engine that gets installed in each Library.



Technical Spec sheet

1. Server



CPU	IntelCore i7-8550u
TDP	15W
Memory	2xDDR4-2400 SO-DIMM max 32GB RAM
Storage	3 Storages no capacity limitation
Main Chips	FCBGA1356 CPU, SIO IT8786E, 64 Mb SPI Flash BIOS, RT3602AHVRM, ALC662-VD Audio Chip
Graphics	Intel® UHD Graphics 620
LAN	2xINTEL-I211 Gigabit RJ45 Lan
Switch	1xPower On/Off Switch
USB	4xUSB 3.0, 4xUSB2.0
Display	1xHDMI, 1xEDP, Support 3 Synchronized displays
Power	1x12V DC In
Lan	2xRJ45 Giga Lan Port, 2xWifi Antennas
COM	4xRS232 Port, 2xRS485 Port
Audio	1xSPK Out, 1x MIC In
LPT	1xPrinting Port
SIM	NdCount Interface module with B10T9 Facial Recognition Algorithm

2. Console

NdCount Console provides the central view of the system's video analytics capabilities in four tabs:

Dashboard

- **Events:** displays recent events (e.g. Visit of Person in Gallery), with event acknowledgement and filtering
- **Persons:** displays recent Visits of Persons to camera Zones (group of cameras within a defined area)
- **Event Detail/Person Detail:** provides a detailed description of an event or a person of interest; person details view shows all appearances of a person and allows playback
- **Statistics:** displays the collection of statistics in charts
- **Camera Monitoring:** shows live video streams from one or multiple cameras
-

Technical Spec sheet	
3. Video Source	<p>The following cameras have been tested extensively in a well-defined Environment:</p> <ul style="list-style-type: none"> - Allied Vision GigE Prosilica (GC 1380, GC 1600, GE 1650, GT 1290, GT 1910, GT 1930L, GT 2000, GX 1920) - Basler GigE ace series monochrome and color (acA 1600-20, acA 1600-60, acA 1920-40, acA 1920-50) - IDS GigE uEye monochrome and color (5250CP/SE, 5260CP, 5360CP, 6250SE) - Point Grey GigE Blackfly and Flea3 series (BFLY-PGE-20E4MCS, BFLY-PGE-13E4M-CS, FL3-GE-20S4M-C, FL3-GE-20S4C-C) <p>NdCount works with different protocols and, therefore, also operates in principle with:</p> <ul style="list-style-type: none"> - IP cameras accessible via MJPEG (http) - IP cameras, USB, and FireWire cameras via DirectShow drivers - video file format support (MPEG2, MPEG4, AVI, etc.) via codecs provided by GStreamer - IP cameras accessible via the GStreamer multimedia framework
4. NDCount Portal and Data Repository Environment	<ul style="list-style-type: none"> - Hosted in a South African Data Centre ranked as Africa's most interconnected Data Centre. - Using an interconnected network architecture approach to allow the highest system performance, reduce latency, scale on-demand, lower network costs, and visibly deliver a better cloud experience to end-users - Connected to the largest Internet exchange point (NAPAfrica) with over 500 peering ISPs over Africa
5. Technical facts	<p>Operating systems (64-bit versions)</p> <ul style="list-style-type: none"> - Windows 7 (all editions) - Windows 8.1 - Windows 10 - Windows Server 2008 R2 - Windows Server 2012 R2 - Windows Server 2016 - SUSE Linux Enterprise Server 12 <p>Database</p> <ul style="list-style-type: none"> - Implemented with PostgreSQL - operational data can be synchronized with external databases
6. Integration	<ul style="list-style-type: none"> - NdCount provides a REST API for the ease of integrating with any other system to pull consolidated data into a single platform - NdCount already integrates into Leading LMS systems implemented in the South African Public Library space

Technical Spec sheet

7. Facial Matching Engine

Incorporates B10T9 facial recognition algorithm

Algorithm is robust against

- typical gesture changes
- pose (+/- 15° deviation from frontal image)
- partial face occlusion
- beard and hairstyle changes
- glasses
- lighting variations

Minimal still image requirements for facial recognition

- sharp image
- inter-pupil spacing larger than 32 pixels
- at least 64 grayscale values within the face area

Image requirements for optimal facial recognition

ISO 19794-5 compliant Token Frontal or Full Frontal Images

Biometric characteristics

- configurable score threshold

NdCount Reporting Portal

<p>1. Secured Login</p>	<p>Access to the central data repository is secured and can only be accessed by the dedicated staff through user-based access roles allocated. No personal data of the patrons are accessible on the central repository in line with the requirements of the POPIA Act. Users are only able to view anonymous statistical data for each of the libraries.</p>
<p>2. Regional and Provincial user access roles</p>	<p>A consolidated view of the region or province is provided to give a management view and a count of all libraries with patron statistics per library.</p>
<p>3. Library-level accessible data</p>	<p>Based on allocated user access rights, users are able to access near real-time graphical statistics of patrons in a library, region or department. The total number of patrons and a breakdown by gender classification and age distribution are provided. The user also has the capability to specify a date range and have the capability to view comparative data for that period.</p> <p>All reports are exportable to PDF or Excel for any date range.</p> <p>Statistical information for each library is also visible on a GIS map, providing management information.</p>
<p>4. Administration function</p>	<p>The administrative configuration function gives the administrators the functionality to add libraries, users, regions. It also provides an audit trail and viewing logs of activities by every system user to view how many times a library user has used the system.</p>