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Evaluating the ADSW4000 ADI EagleEye™ PeopleCount Algorithm

FEATURES

Occupancy detection
Space optimization
People tracking and monitoring
Social distancing detection

EQUIPMENT NEEDED

EVAL-ADSW4000KTZ (ADI EagleEye™ trial kit)
PC running Windows® 8 or later, or tablet running iOS 12 or later or Android 7.0 or later

DOCUMENTS NEEDED

All ADI EagleEye™ documentation is available in the software package of the ADI EagleEye™ trial kit

SOFTWARE NEEDED

ADI EagleEye™ PeopleCount iOS or Android tablet app (recommended for commissioning)
ADI EagleEye™ software package (optional, only for advanced debugging and troubleshooting)

GENERAL DESCRIPTION

ADI EagleEye™ is the technology combination of the ADSP-BF707 Blackfin® digital signal processor (DSP), the ADSPBF707BBCZ4-EGE, and Analog Devices, Inc., proprietary software analytics algorithms. The ADSW4000 ADI EagleEye™ PeopleCount algorithm enables a 2D vision, sensor-based, people counting and location solution for rooms and open areas.

The EVAL-ADSW4000KTZ, or ADI EagleEye™ trial kit, is the full sensor to cloud evaluation system.

The ADI EagleEye™ trial kit comprises the ADI EagleEye™ DSP subsystem, a cortex-based microcontroller unit (MCU) subsystem, flash memory, ADI EagleEye™ analytics algorithm, and application firmware.

The ADI EagleEye™ trial kit features a 2D vision sensor (the Chicony CYFI013 module) with a Bluetooth interface for commissioning via a tablet app and cloud connectivity over Wi-Fi for uploading metadata to the cloud.

A companion tablet application, the ADI EagleEye™ PeopleCount app, is available for device commissioning. A cloud-based online dashboard is available to users to access the collected data and a set of actionable insights.

Figure 1 shows the ADI EagleEye™ reference design block diagram.

REFERENCE DESIGN BLOCK DIAGRAM

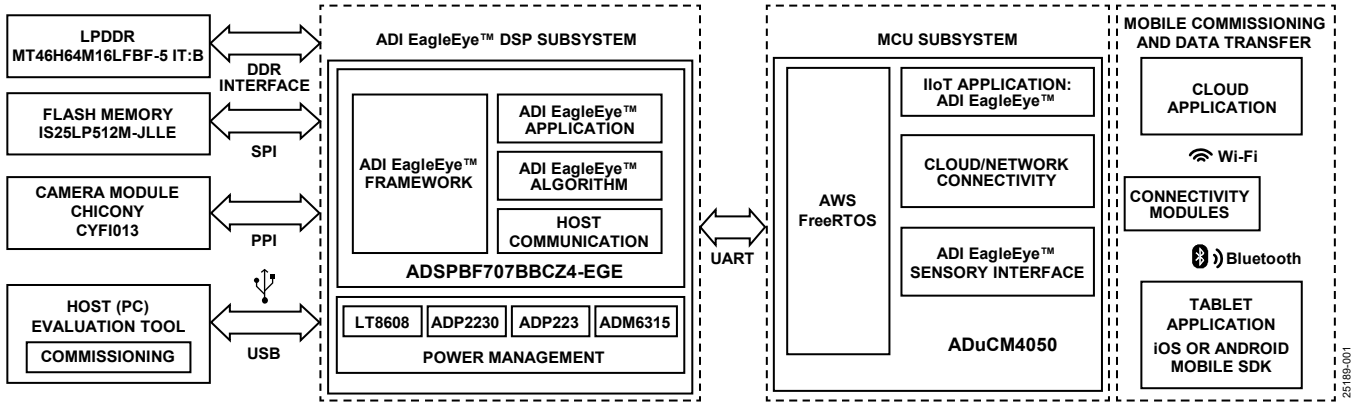

Figure 1.

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REVISION HISTORY

4/2021—Revision 0: Initial Version

HARDWARE

POWER SUPPLIES

The ADI EagleEye™ trial kit is equipped with a wide voltage range power management circuit, which allows for the following power supply options:

- Micro USB (~1 m cable length). An active USB extension is recommended when using cables longer than 1 m.
- DC connector (5.5 V to 36 V dc).

INSTALLATION OF THE SENSOR

Mount the sensor on the ceiling at the center of the room or region of interest (ROI) and remove the lens cap (if present). The lens of the device must face down and cover the entire room or ROI, including the corners of the space. Users can check for the proper installation of the sensor and the field of view (FOV) during the commissioning process in the ADI EagleEye™ PeopleCount tablet app, as described in the Commissioning section.

Installation Height

The recommended installation height for the sensor is between 2.44 m and 3.00 m (8 ft and 10 ft).

Sensor Mounting: Horizontal

Ensure that the sensor is mounted horizontally at an angle of 90° to the floor (see Figure 2).

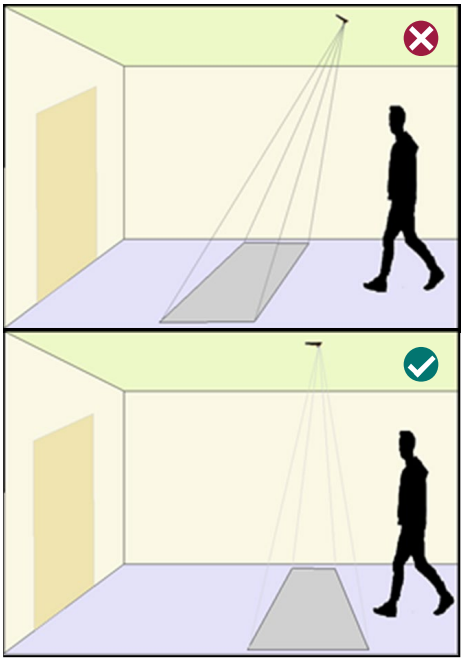

Figure 2 Improper (Top) and Proper (Bottom) Alignment of the Sensor Parallel to the Floor Area

Sensor Mounting: Axis

Ensure that the longer dimension in the ROI corresponds to the x-axis of the camera module to maximize the FOV, as shown in Figure 3.

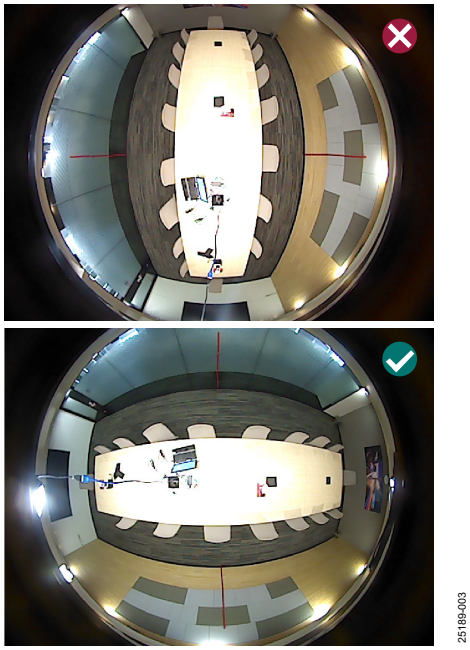

Figure 3. Improper (Top) and Proper (Bottom) Alignment of the Sensor to Maximize the FOV

Sensor Mounting: Alignment

Ensure that the sensor is mounted parallel to the borders of the room and is not rotated. If the sensor is properly aligned, the walls appear symmetric at the center of the captured image (see Figure 4).

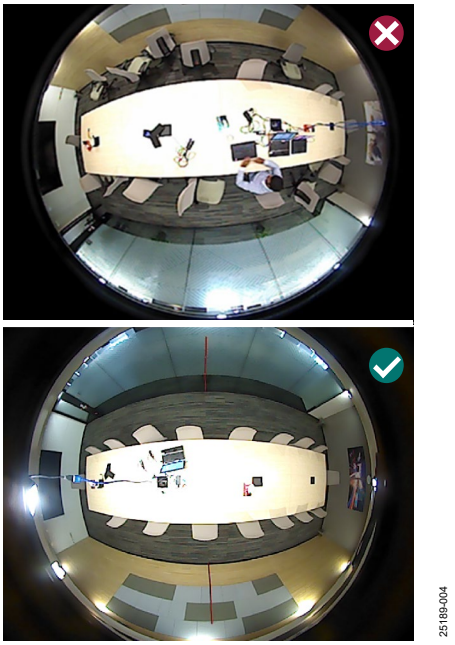

Figure 4. Improper (Top) and Proper (Bottom) Alignment of the Sensor Parallel to the Walls

The monitored area must be roughly in the center of the captured image (see Figure 5).

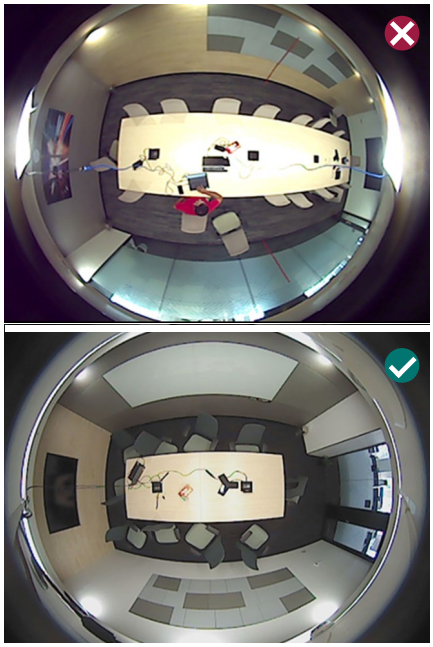

Figure 5. Improper (Top) and Proper (Bottom) Mounting of the Sensor in the Center of the ROI

Do not install the device in the path of direct sunlight or intense light, which can cause dark shadows. If there are projectors in the ROI, ensure that the light from the projector does not shine directly into the lens of the sensor. It is recommended to install the device behind a projector without obstructing the view of the sensor.

SENSOR LEDs

The LEDs on the sensor (see Figure 6) indicate different states of booting and move through several functional states, as described in Table 1.

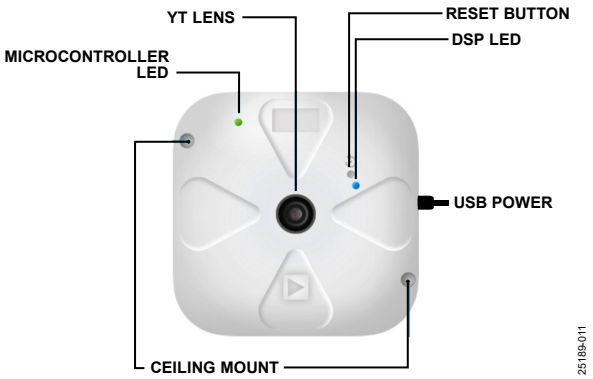

Figure 6. Main Features of the Sensor

Table 1. DSP and MCU LED Indications During Boot, Commissioning, and Metadata Transmission

State[1]	DSP LED	MCU LED
Sensor Boot	Red	Red
Sensor Ready to Connect	Cyan	Green (2 seconds) followed by purple (blinks)
Tablet App Connected	Cyan	Blue
Image Fetch to Walk Test	Yellow	Blue
Walk Test to Operational Mode	Off	Blue
Selecting a Wi-Fi Network	Off	Blue
Connecting to a Wi-Fi Network	Off	Cyan (blinks)
Wi-Fi Network Connection Successful	Off	Red
Connecting to the Cloud	Off	Red (blinks)
Sending Metadata to the Cloud	Cyan (blinks)	Green (blinks)
Lost Connectively Between the Sensor and Tablet App	Off	Red (blinks)

[1] As shown in the ADI EagleEye™ PeopleCount tablet app.

SOFTWARE

COMMISSIONING

Ensure that the ADI EagleEye™ PeopleCount iOS or Android app is installed on a tablet. It is recommended to use an Apple iPad with iOS 12 or later or a Samsung Galaxy Tab S3 with Android 7.0 or later. The ADI EagleEye™ software package is also available for commissioning, but this PC tool is only recommended for advanced debugging and troubleshooting.

Note that if the sensor has been previously commissioned and is being reconfigured, the device must be power cycled before connecting to the sensor with the tablet app. Take the following steps to power cycle the sensor and reconnect to the tablet app:

1. Press the sensor power button. After the sensor reboots, wait approximately 45 seconds until the DSP LED turns from red to cyan and the MCU LED starts blinking purple (see Table 1 for a description of the LED indications).
2. Connect to the sensor using the tablet app to ensure that the previous configuration settings are not applied and the device is properly recommissioned. For instructions on how to connect to the sensor using the tablet app, see the Connecting to the Sensor Using the ADI EagleEye™ PeopleCount Tablet App.

Connecting to the Sensor Using the ADI EagleEye™ PeopleCount Tablet App

Take the following steps to commission the sensor with the ADI EagleEye™ PeopleCount tablet app:

1. Open the tablet app and log in with the Analog Devices Cloud login credentials provided during the registration to the Analog Devices cloud (see Figure 7).

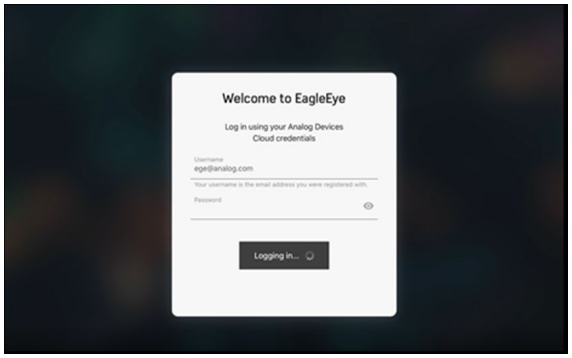

Figure 7. Analog Devices Cloud Login Screen

2. Read and accept the terms of use.
3. Install the sensor in the designated area and connect the USB cable to a USB power source (see the Installation of the Sensor section for the installation instructions). Wait approximately 45 seconds until the DSP LED turns from red to cyan and the MCU LED starts blinking purple.
4. Select the sensor from the devices listed to begin the commissioning process (see Figure 8). If prompted, allow the tablet app to access Bluetooth to detect the sensor and display it in the list.

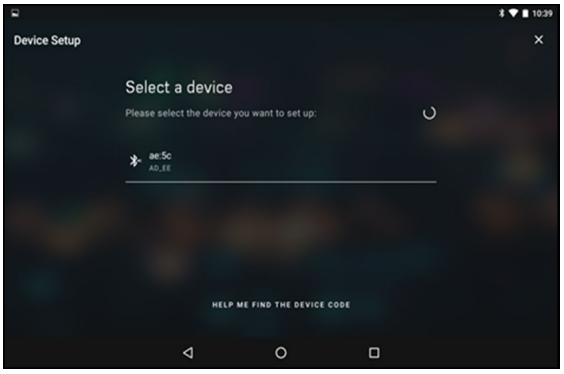

Figure 8. List of Devices Found in App

5. Define all commissioning masks to set up the monitored space (see Figure 9). Each step is explained in the app with instructions and animations.

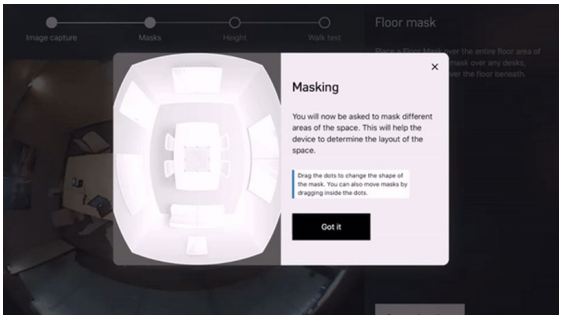

Figure 9. In App Animation Guiding the User Through the Commissioning Process

6. When the commissioning process completes, select the preferred Wi-Fi network to upload the ADI EagleEye™ trial kit metadata to the Analog Devices cloud (see Figure 10).

Figure 10. Available Wi-Fi Networks in App

7. Enter the Wi-Fi credentials when prompted and click **Connect and Finish** (Figure 11 shows a successful Wi-Fi connection). After the commissioning process, the sensor is registered on the Analog Devices cloud. The sensor automatically restarts and connects to the selected Wi-Fi network to upload the metadata.

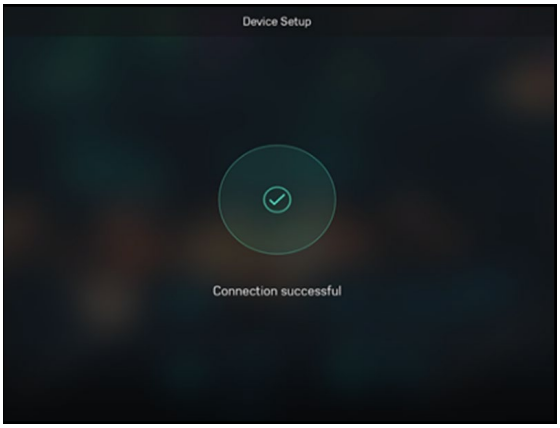

Figure 11. Wi-Fi Connection Successful

ONLINE DASHBOARD

When the ADI EagleEye™ trial kit commissioning process completes, the user can access the online dashboard to view the data transmitted from the sensor to the Analog Devices cloud.

To access the online dashboard, visit https://peoplecount.analogcloud.io/ and log in with the Analog Devices cloud login credentials provided during the registration to the Analog Devices cloud.

ORDERING INFORMATION

BILL OF MATERIALS

Table 2.

Item	Qty	Description	Manufacturer	Part Number
EVAL-ADSW4000KTZ	1	ADI EagleEye™ trial kit	Analog Devices	EVAL-ADSW4000KTZ
ADSP-BF707	1	Blackfin special DSP	Analog Devices	ADSPBF707BBCZ4-EGE
LT8608	1	Step-down regulator	Analog Devices	LT8608IMSE#TRPBF
ADSW4000	1	PeopleCount perpetual license	Analog Devices	ADSW4000-P
ADP2230	1	Buck regulator	Analog Devices	ADP2230ACPZ-R7
ADP223	1	Dual voltage regulator	Analog Devices	ADP223ACPZ-R7
ADM6315	1	Supervisory circuit	Analog Devices	ADM6315-29D2ARTZR7
ADuCM4050	1	Microcontroller	Analog Devices	ADuCM4050BCPZ
Camera module	1	Chicony 2D vision sensor	Chicony	CYFI013
Low power double data rate (LPDDR) memory	1	LPDDR synchronous dynamic random-access memory (SDRAM) 1 GB (64M ×16)	Micron Technology Inc.	MT46H64M16LFBF-5 IT:B
Flash memory	1	Serial flash memory	Integrated Silicon Solutions, Inc.	IS25LP512M-JLLE

RELATED LINKS

Table 3.

Resource	Description
ADI EagleEye™	ADI EagleEye™ people counting technology webpage

ESD Caution
ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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