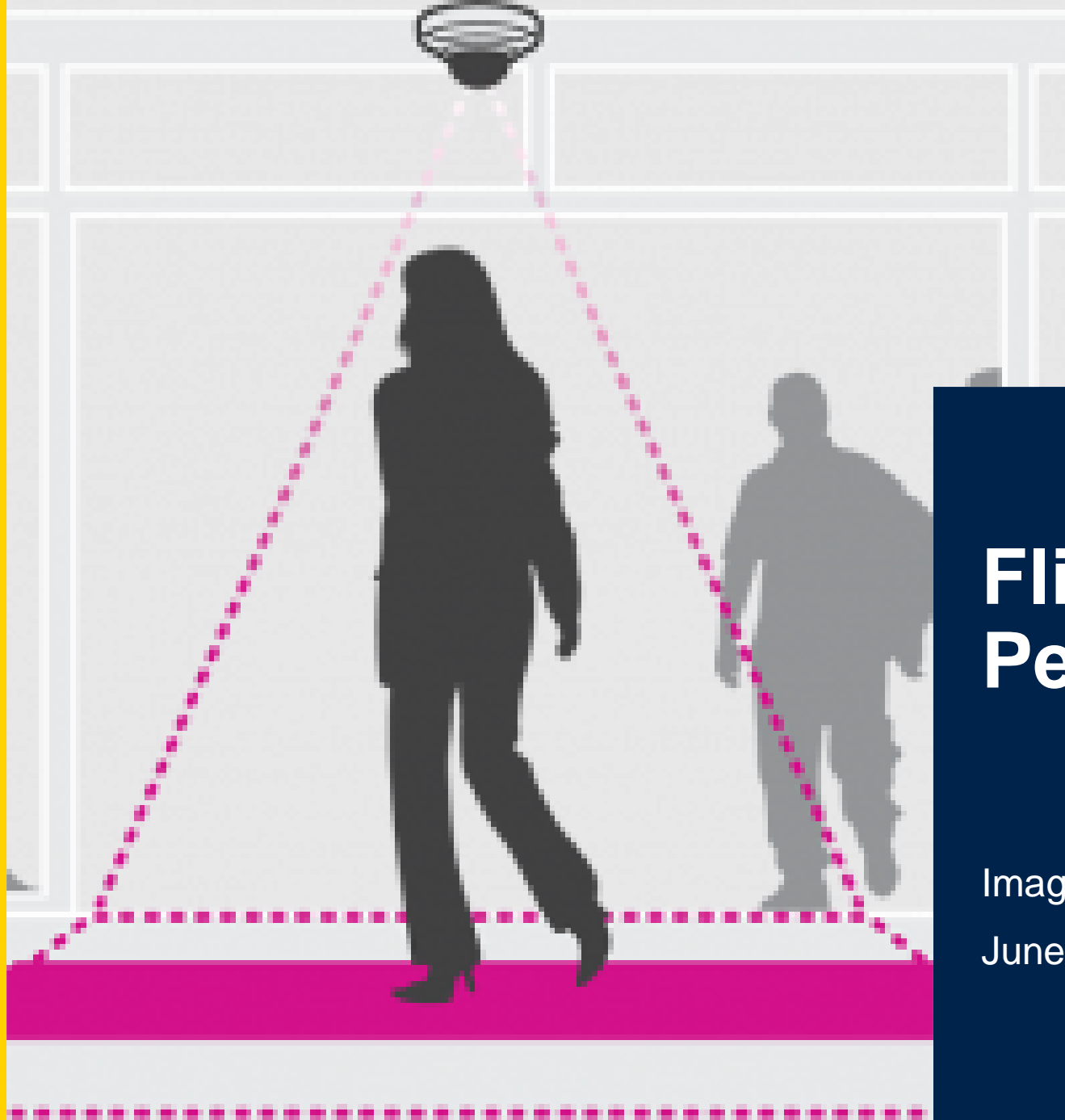




life.augmented



FlightSense™ People Counting

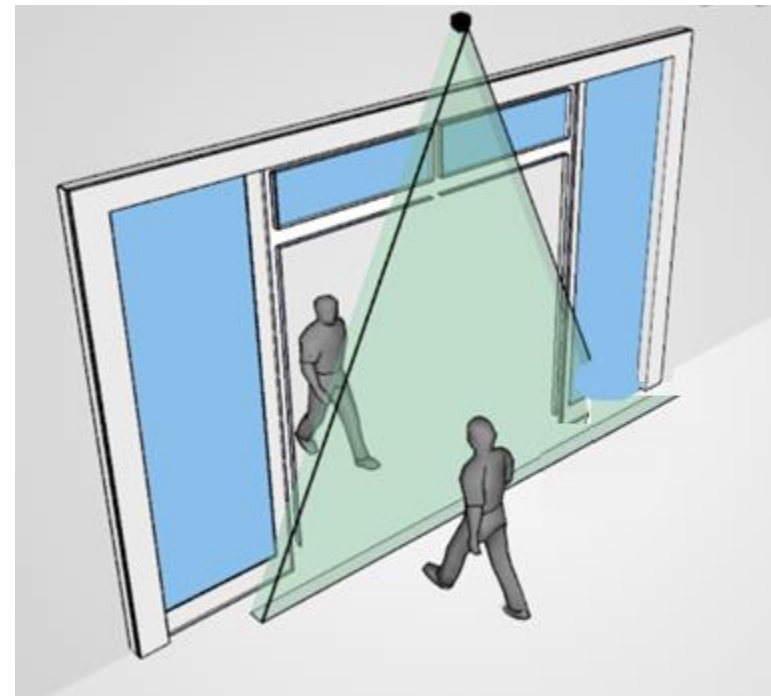
Imaging Division – Dominique Barbier

June 23th 2020



What is 'People Counting'?

- VL53L1CX Time-of-Flight (ToF) can be used to count people crossing a certain pre-defined area, like a meeting room entrance, a specific location or even a hallway
- People counting is perfect for monitoring room occupancy



People Counting

using a Single ST
Time-of-Flight Sensor

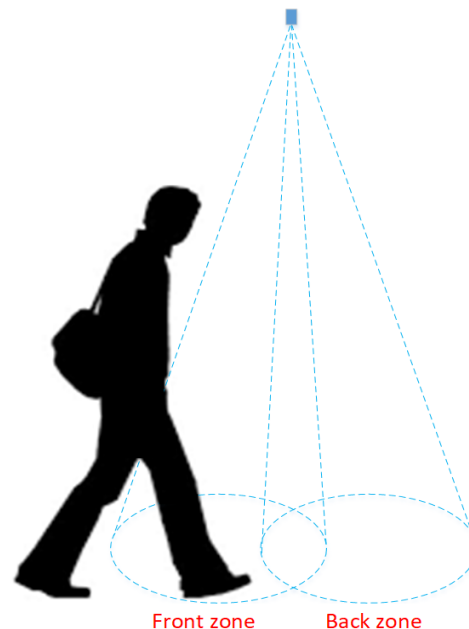


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People Counting Concept

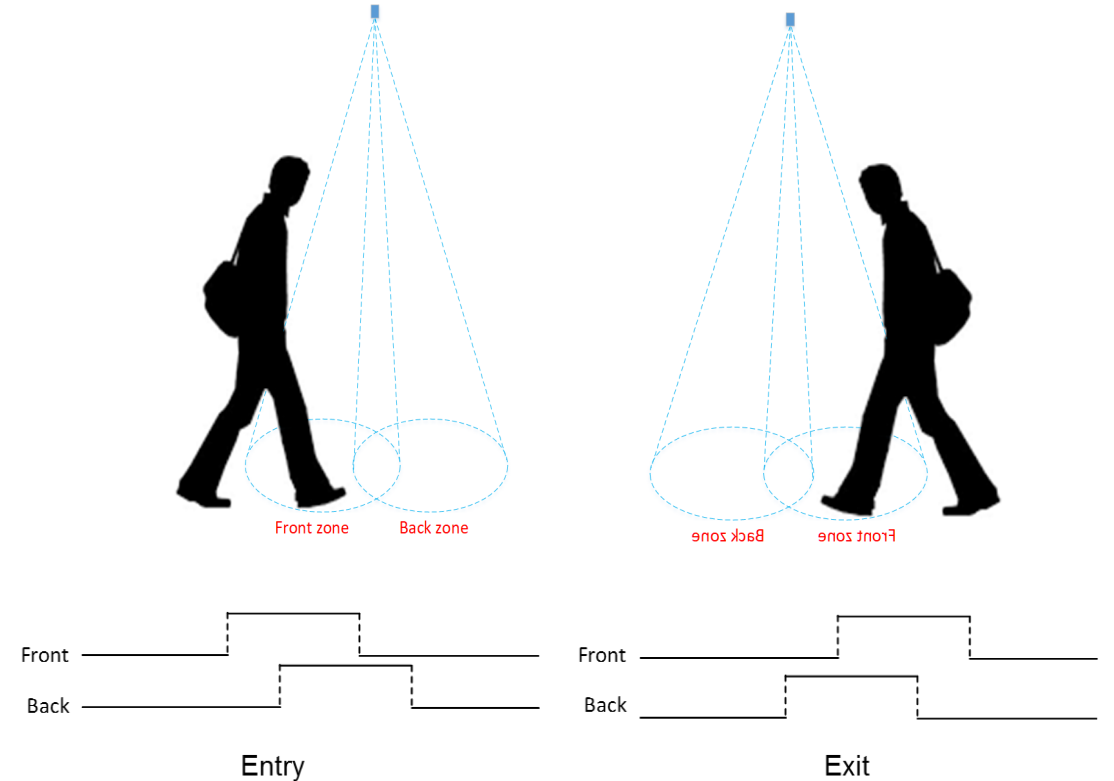
- Counting people with VL53L1CX consists of using the multizone capability of the sensor, and using 2 zones
- The 2 zones are used to alternatively get a distance and direction of moving person





VL53L1CX field of view

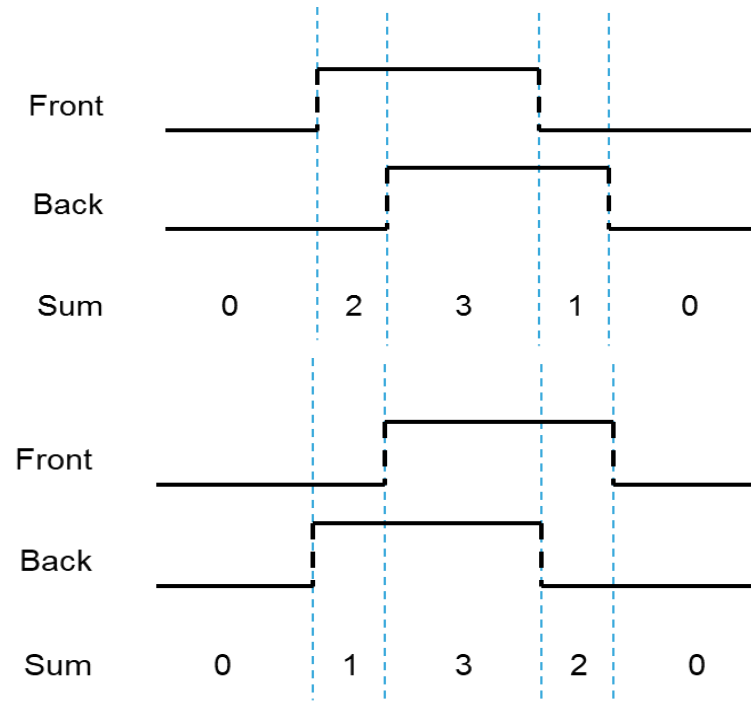
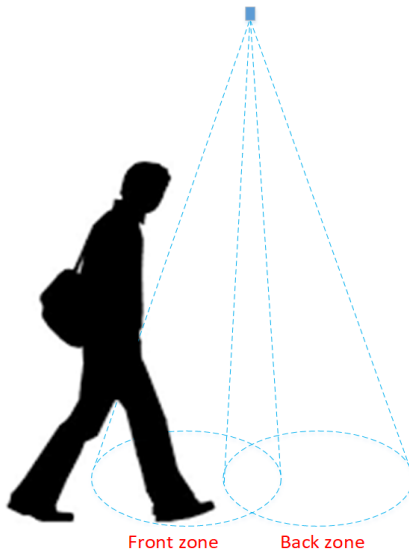
- VL53L1CX sensor alternatively ranges on each of the 2 zones, very quickly (milli seconds). By doing so, the system can determine the direction a person coming through an area.
- If a person makes zone A trigger prior to zone B or vice-versa, then we can easily determine the direction of motion





Algorithm Description

- If a person makes zone A trigger prior to zone B or vice-versa, then we can easily determine the direction of motion



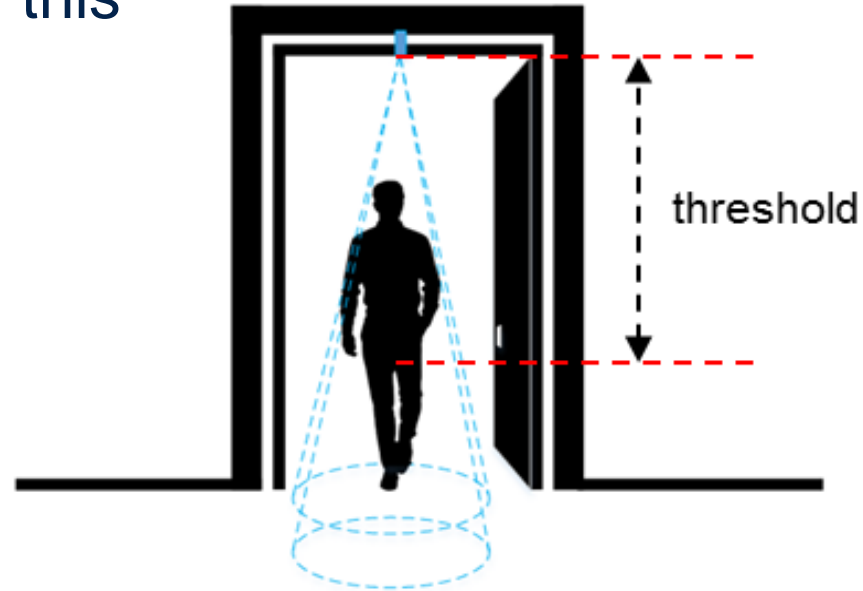
Path track
 0
 0,2
 0,2,3
 0,2,3,1
 0,2,3,1,0
 0
 A person has crossed the area in a certain direction

Path track
 0
 0,1
 0,1,3
 0,1,3,2
 0,1,3,2,0
 0
 A person has crossed the area in the other direction



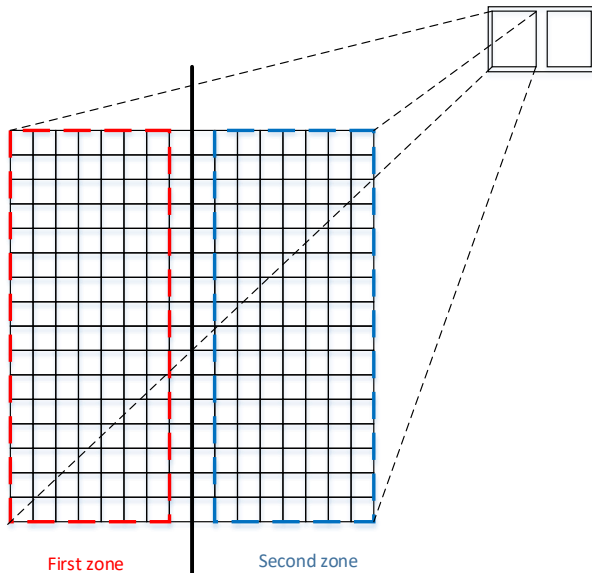
VL53L1CX Threshold

- A threshold is to be defined after ranging on the flooring material over a significant number of samples. Threshold should be chosen so that all the measured distances (when ranging the floor) must be over this threshold.





VL53L1CX sensor and algorithm configuration



- The 2 fields of view must be set in such way that the detection overlap. This can be simply achieved by the sensor, thanks to sensor lens
- Dividing the 16*16 SPADs array of the VL53L1CX sensor into 2 sub arrays is sufficient.
- The size of the 2 arrays can be reconfigured, however what is important is that a person must be seen in the 2 zones at the same time when the person is standing right in the middle of the 2 fields of view.

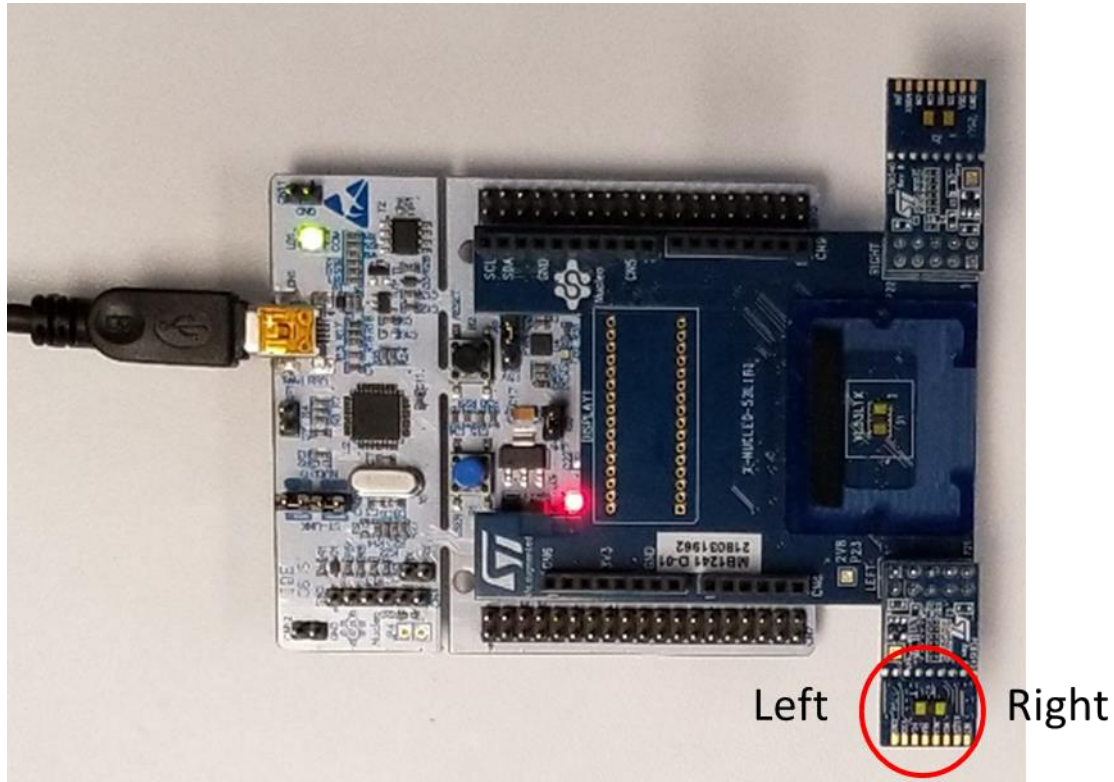


People Counting Solution

- ST offers an algorithm to count people. This algorithm is provided and can be downloaded from st.com, in the VL53L1X Embedded SW section, under the reference STSW-IMG010



Software and board package

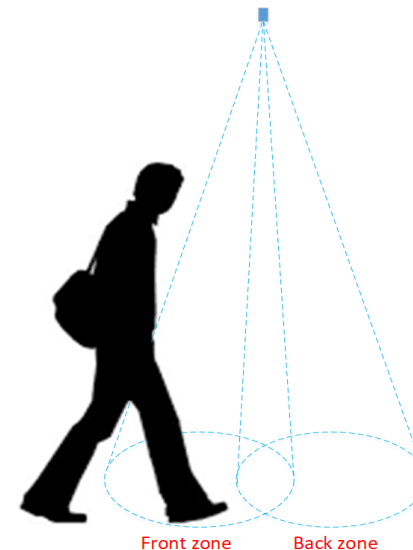


- The software runs on a NUCLEO F401RE board, and will need to have one X-NUCLEO 53L1A1 expansion board
- The system can then be mounted, for example on the top of a door frame, oriented towards the bottom.

Left Right



Left to right = entry
Right to left = exit



Questions