



VL53L0X GesturesDetect User Manual

Version 1.1

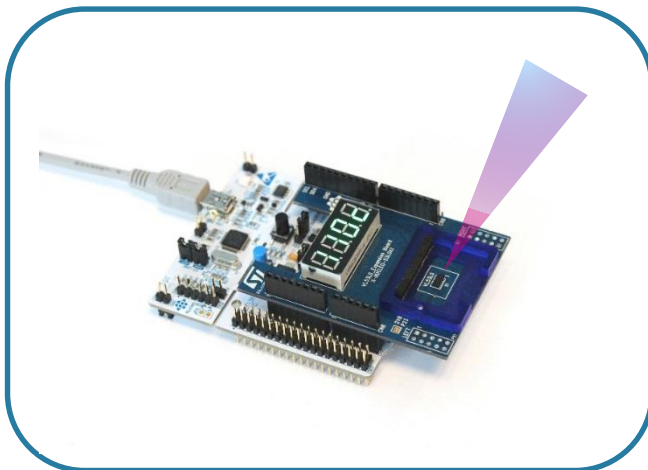
Version	Date	Comments
1.0	11 April 2016	Initial
1.1	15 April 2016	Added data logging details

- Key features

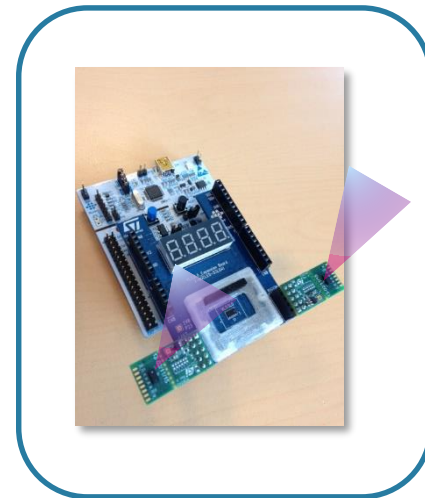
- Basic gestures recognition demo based on ST “ToF Gestures” library
 - See ToFGestures_Documentation (Doxygen) for library description
- Recognized gestures
 - Single VL6180X device (top)
 - Single TAP : **TAP_1**
 - Single SWIPE : **SWIPE_1**
 - Dual VL6180X devices (left/right)
 - Directional swipes (from left to right and from right to left) : **DIRSWIPE_1**

- Hardware

- Nucleo F401RE, L476RG
- Optional VL53L0X satellites : left & right



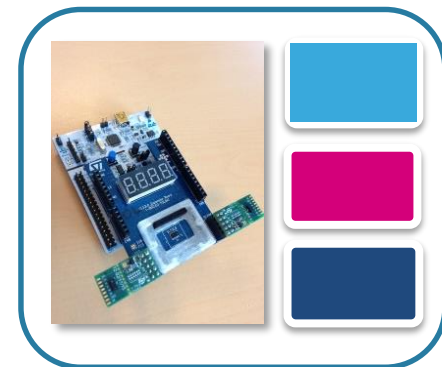
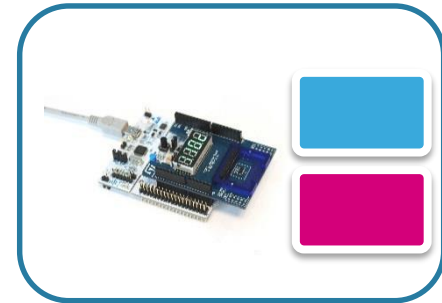
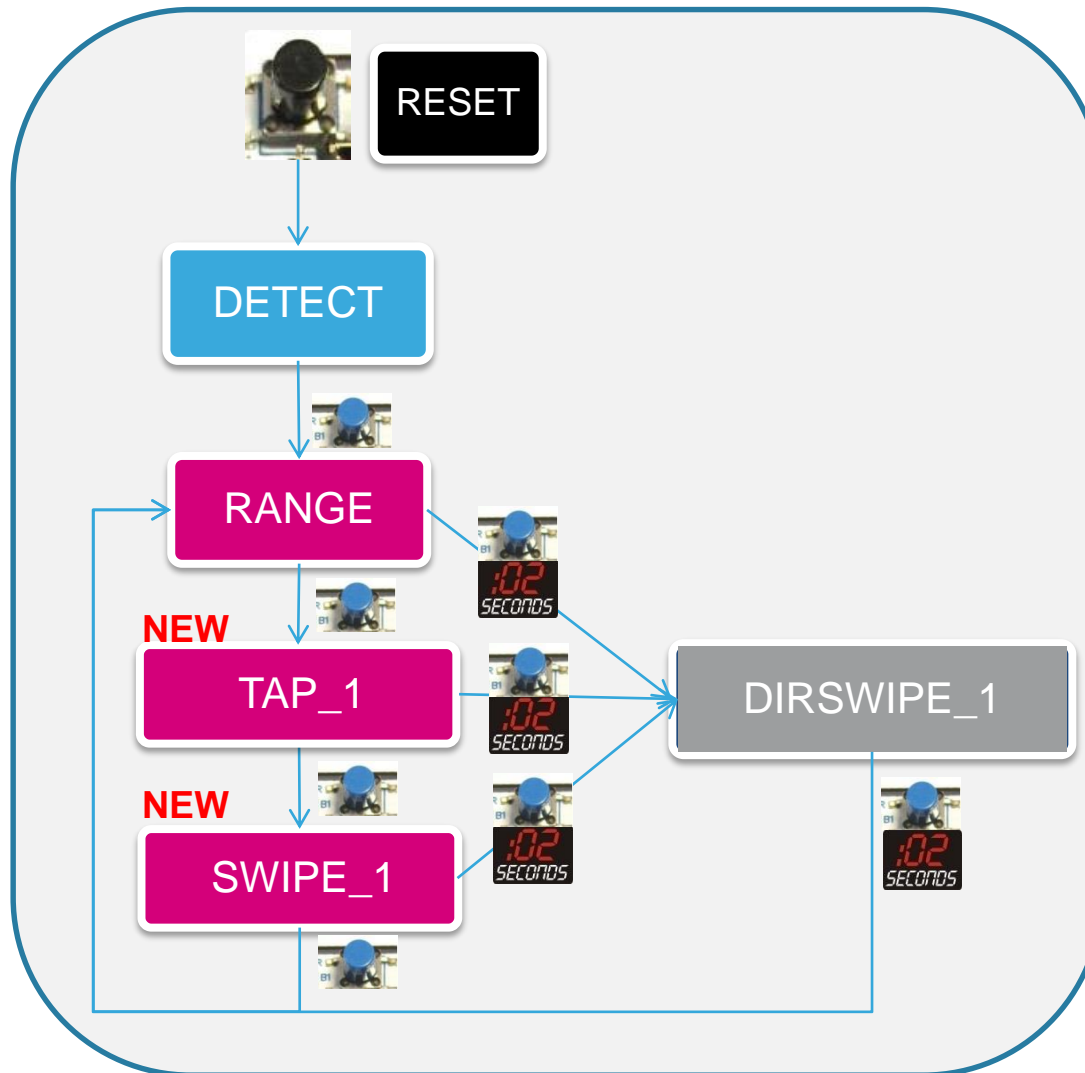
Single VL53L0X device



Dual VL53L0X devices

Demo modes

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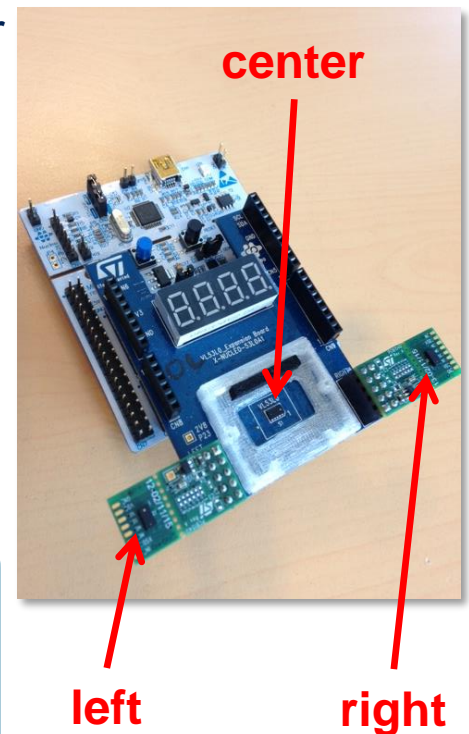
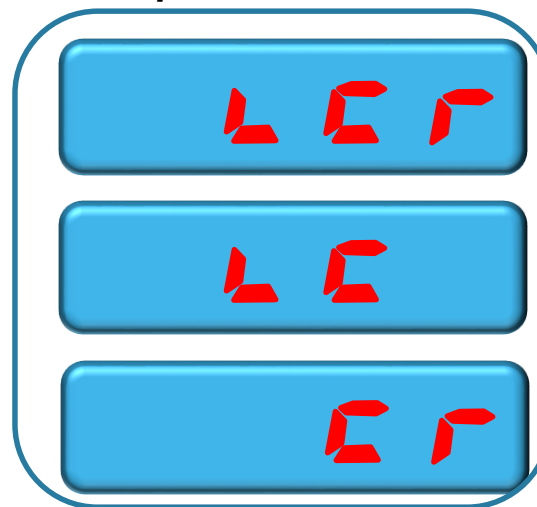


- Automatically detect number and location of VL53L0X devices present on the board
- Display (during 1 sec) detected devices with a single letter
 - **C** : Center device
 - **L** : Left device
 - **R** : Right device
- Each digit of the display is associated with a device
- Supported configurations are

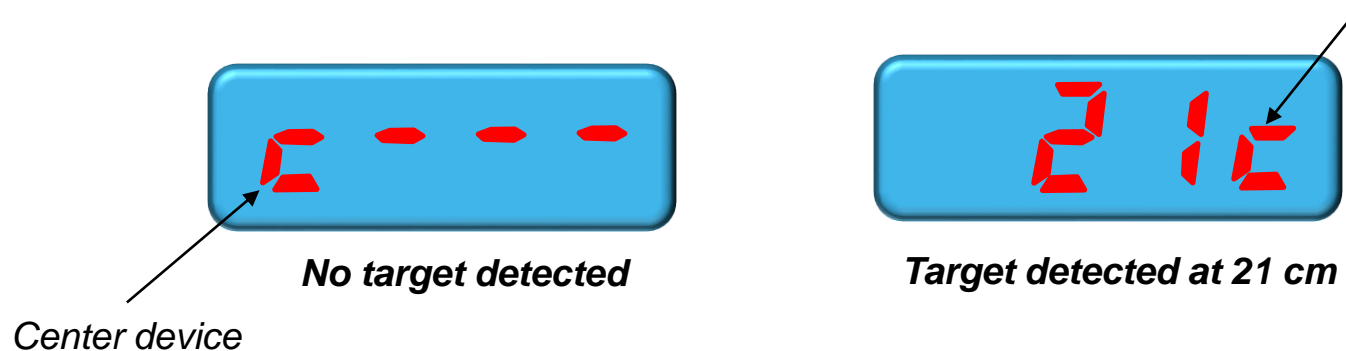
Single VL53L0X device

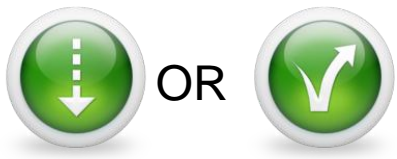


Multiple VL53L0X devices

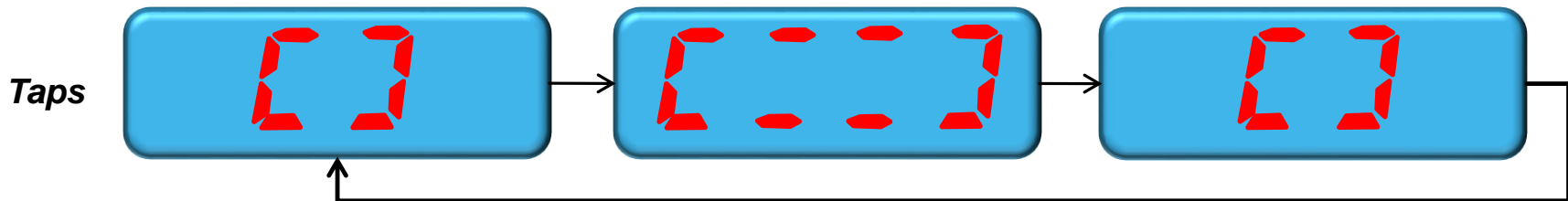


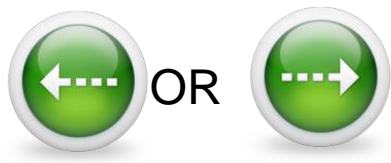
- Display ranging (in cm) from single device (Center)
- No gesture detected (more for debug)
- Offset calibration not done





- Based on simple MAD (Mean of Absolute Difference) and simple analytics (time, thresholds, etc...)
- Detect single taps (from Center device)
 - Single tap
 - Move your hand (flat) vertically (assuming sensor is targeting vertical direction) at a natural speed from a far distance to a close distance, then hand can either stay at close distance or be removed (vertically or horizontally) before another TAP is done
 - Taps can even be done with a single finger close to the sensor
 - Swipes are not detected so that you can enter your hand in the FoV horizontally before starting the TAP
 - Taps can still be detected when a background target is present (detected by the sensor)
 - **Big/Small rectangles are displayed alternatively to show a TAP has been detected**
- Known limitations
 - When a background target is detected, a TAP could be detected when hand is entering in the sensor FoV

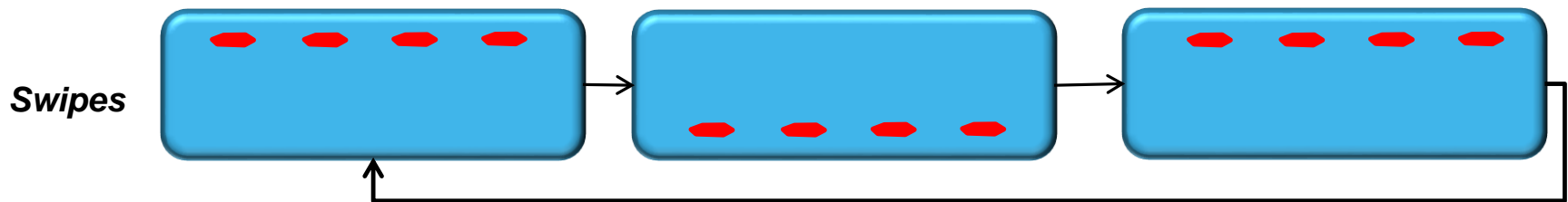




SWIPE_1

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- Based on simple simple analytics (time, thresholds, etc...)
- Detect single swipes (from Center device)
 - Single swipe
 - Move your hand horizontally (assuming sensor is targeting vertical direction) at a natural speed
 - Swipe are detected even if hand is not horizontal ("lazy-man" swipes)
 - Very fast swipes can be detected
 - Taps are not detected
 - Swipes are not detected so that you can enter your hand in the FoV horizontally before starting the TAP
 - Swipes can still be detected when a background target is present (detected by the sensor)
 - **Bottom/top lines are displayed alternatively to show a WIPE has been detected**
- Known limitations
 - A fast gesture entering horizontally in the sensor FoV and leaving vertically may be detected as a Swipe

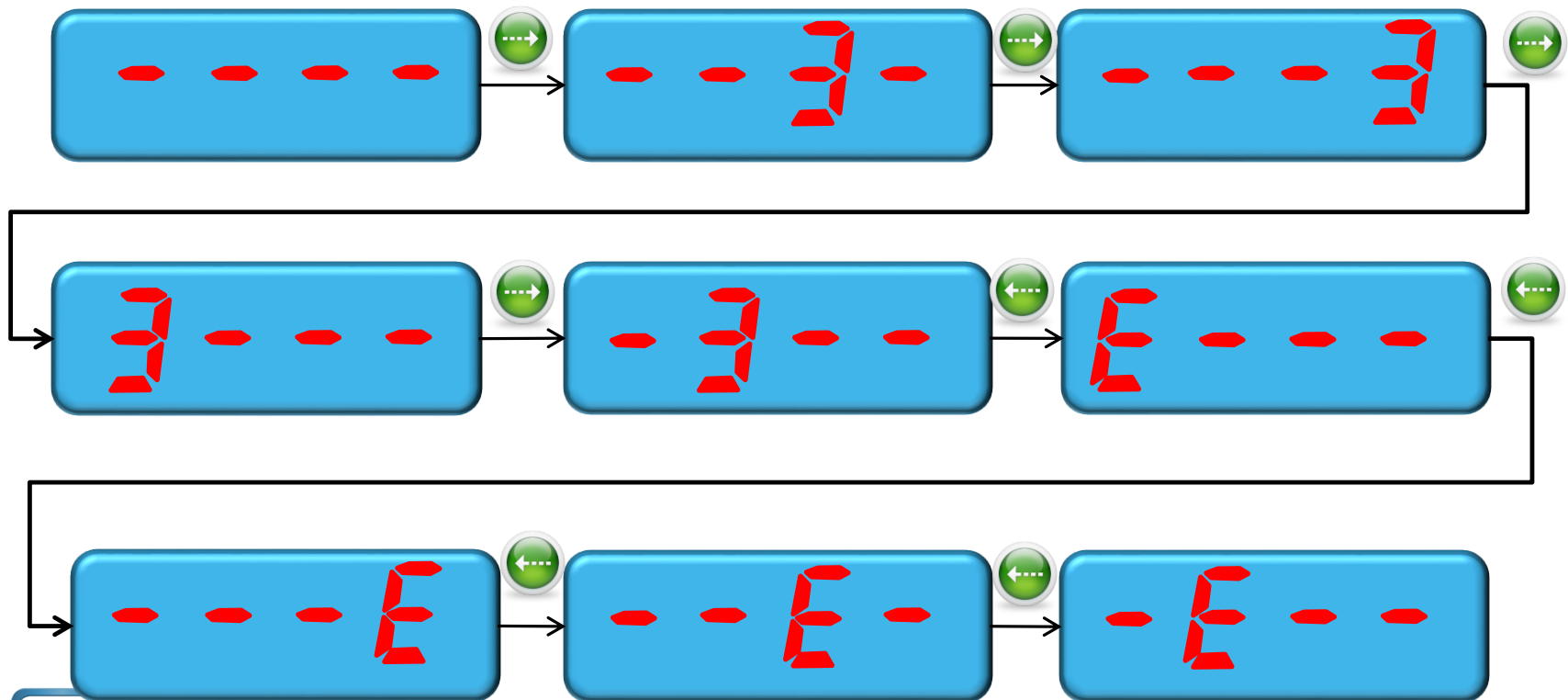




DIRSWIPE_1

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- Based on motion (simple threshold and duration)
- Detect single directional swipes (from Left and Right devices)
 - Move your hand (flat) horizontally from left to right or from right to left
- Directional swipe is displayed as a virtual book (turning pages) as follows



Gesture Data Logging (1/3)

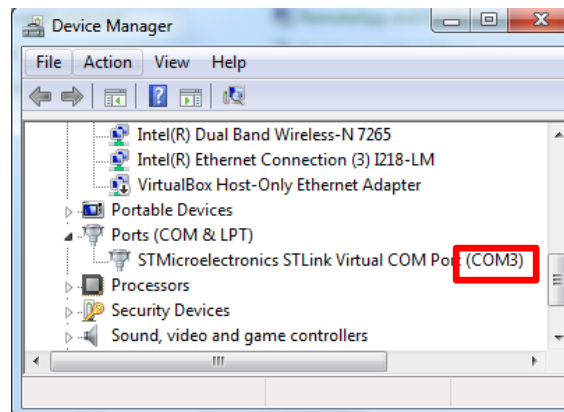
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- It is possible to output some logging info from the Gesture library to PC through serial com over USB. This provides an easy way to fine tune gesture detection algorithms
- By default, data logging is disable in the main.c file
 - `TOF_GESTURES_DEBUG_SET_MODULES(NONE);`
- To enable data logging from TAP_1 gesture algorithm, change the line above as follows, re-compile and start the demo:
 - `TOF_GESTURES_DEBUG_SET_MODULES(TAP_1);`

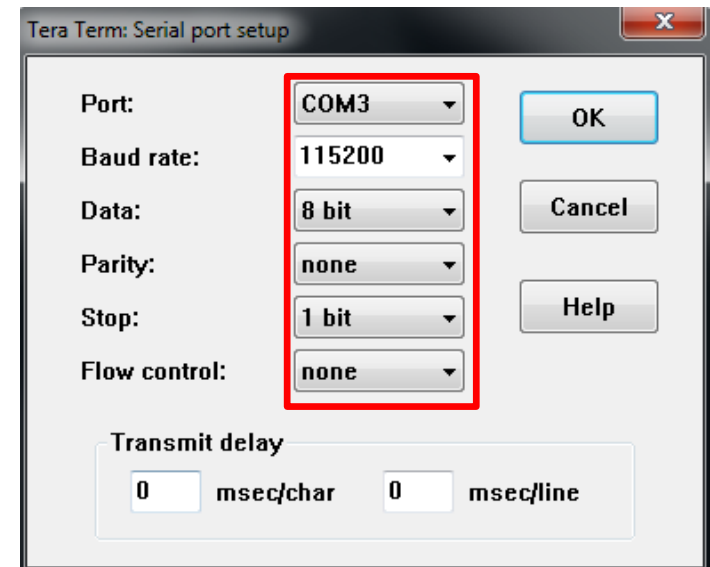
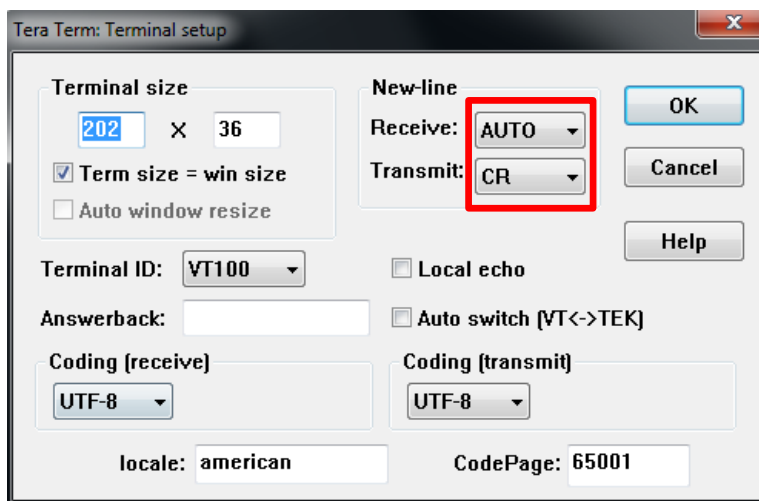
Ranging Data Logging (2/3)

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- Get COM number from Device Manager



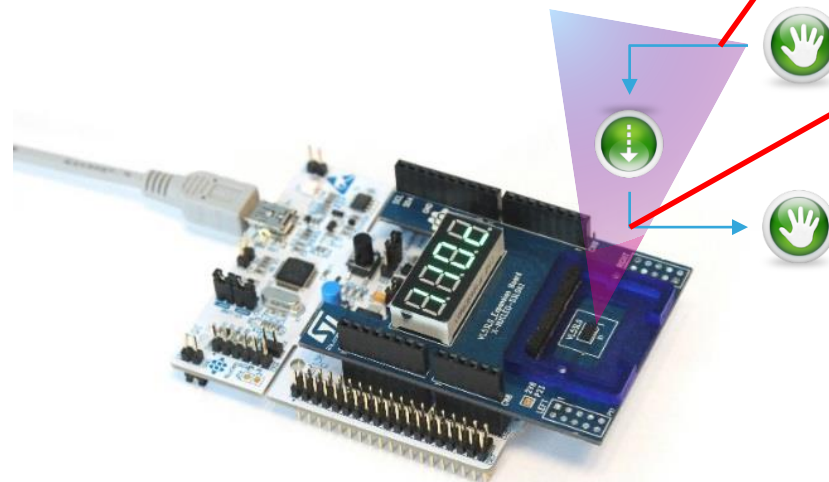
- Serial COM settings (Tera Term example on COM3)



Ranging Data Logging (2/3)

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```
IOF GESTURES tof_gestures_detectIAP_1 040840 (<background_thd=1140, current=1200, hand_entering=0>
IOF GESTURES tof_gestures_detectIAP_1 040857 (<background_thd=1140, current=1200, hand_entering=0>
IOF GESTURES tof_gestures_detectIAP_1 040874 (<background_thd=1140, current=1200, hand_entering=0>
IOF GESTURES tof_gestures_detectIAP_1 040891 (<background_thd=1140, current=1200, hand_entering=0>
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IOF GESTURES tof_gestures_detectIAP_1 041035 (<hand_entering=1, current=212, decide=0, tap=0>
IOF GESTURES tof_gestures_detectIAP_1 041056 (<hand_entering=1, current=149, decide=0, tap=0>
IOF GESTURES tof_gestures_detectIAP_1 041077 (<hand_entering=1, current=112, decide=1, madRange=49, dir=-1, tap=1>
IOF GESTURES tof_gestures_detectIAP_1 041077 (<hand_entering=1, current=112, decide=0, tap=0>
IOF GESTURES tof_gestures_detectIAP_1 041100 (<background_thd=1140, current=1200, hand_entering=0>
```



Tap detected