

Instructions:

Components:

- 2 receiver boards, each connected with a long USB cable
- 1 USB hub (to be connected to the 2 receiver boards... and to the computer, of course 😊)
- 1 transmitter module
- 1 power bank (including short USB cable for power supply of the transmitter module)

How to arrange the components:

Receiver boards:

Introducing comments:

1. one receiver board is equipped with LEDs on the front -> this is board 1
2. the other one is board 2
3. the receiver boards have a receiving side and a back side. The receiving side is the side where you can see the 5 rectangular patches in L-orientation of the antenna array
4. the other side, where you can see the electrical components, is the back side

Let's start:

- board 1 has to be placed on the right, board 2 on the left
- the distance between the boards should not be less than 1.5 m (2 m - 2.5 m would be a great choice)
- orientation: the receiver boards should be oriented vertically with the connecting cable down
- of course the receiver boards should be oriented with their receiving side towards the transmitter board
- the receiver boards must be connected to the USB hub and the usb hub to the computer
- there is no additional power supply, the boards are supplied via USB
- board 1 should be rotated by 45 ° towards board 2 because of the following reason: The estimation errors of the boards are minimum perpendicular to the plane where the patches are placed... Comment: You have to set the rotation angle just after the start of the software. Positive angles mean „rotated from board one in direction of board two“. Zero degrees means perpendicular to the above mentioned antenna plane
- The height where the receiver boards are placed should more or less be the same as the height of the transmit module.

Transmitter module:

- the transmitter module needs power supply by connection to the power bank (via USB cable)
- that's it

Software:

- run the software

- measure the distance of the receiver boards
- set the distance on the receiver boards (in meters)
- set the orientation angles
- check if the software shows a running list of measurement values (x-position and y-position) with positive sign (otherwise the arrangement of the receivers is probably wrong)
- if there is no running list of measurements visible, check (the order of) the COM-ports the receiver boards are connected to.
- open the graphical illustration of the position. The origin of the coordinate system represents the position of board 1. The grey lines show the approximate area where the angle estimates calculated by the receiver boards show small estimation errors (roughly $\pm 45^\circ$). Check if the orientation of the middle of the two grey lines fits to the physical orientation of the receiver boards.
- move the transmitter module and check if the estimated position is
 - o updated
 - o feasible
- final comments:
 - o for the current prototype (where only fundamental and easy methods for error mitigation are implemented...) a line of sight between transmitter and receiver would be beneficial.
 - o Within some centimeters around the receiver modules metallic objects may create substantial errors because they have a physical impact on the receiving antennas... please keep an eye on this...

If in trouble, call 07541 / 2077-139