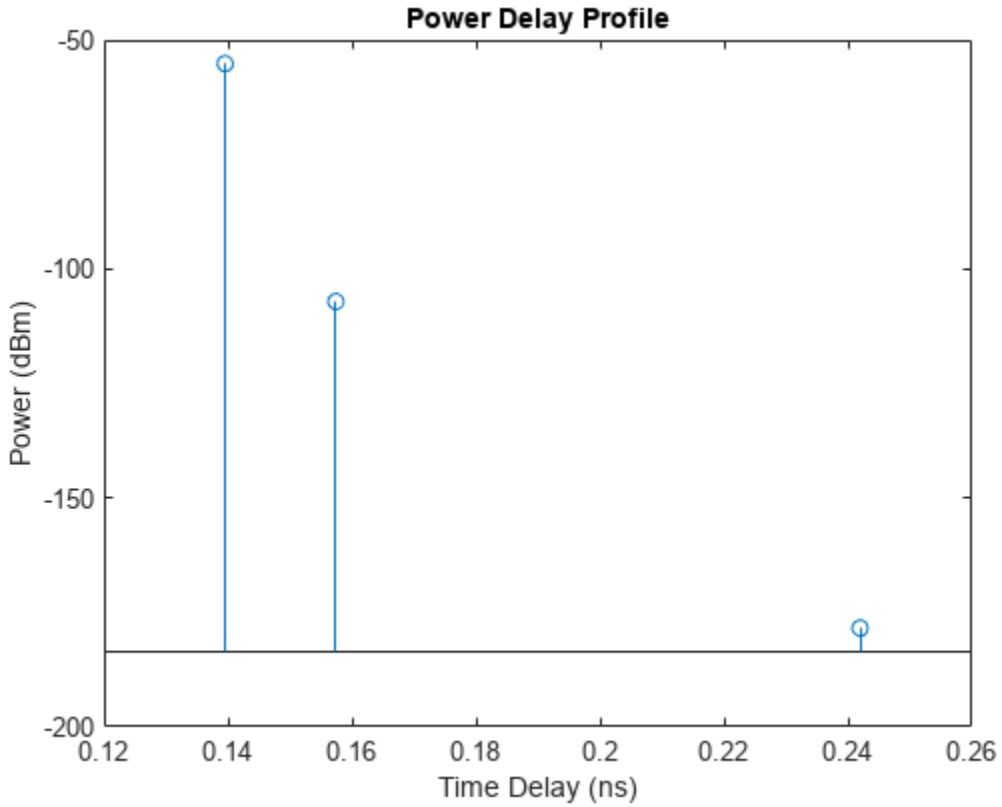
Welcome to Depth Camera Ray Tracing Simulator, in this document, we will talk about the usage and the function of this simulator in Matlab.

1) Make sure you have the point cloud and mlx file downloaded in the same folder.
2) Run the mlx file.
3) Enter the coordinates of TX and RX referring to the spreadsheet in the Gitlab.
4) Enter, full, hit Enter.
5) Plot of the PDP:



These are the power received at RX, representing direct path, single bounce, and then the double bounce. The base value is set at 5 dB lower than the lowest power.

6) Abbreviation table in the console:

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| Abbr | Actual Word          |
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| AOI  | angle of incidence   |
| AOA  | angle of arrival     |
| TX_mirror | TX mirror point against right plane |
| RX_mirror | RX mirror point against left plane |
| double_intersect_point_1 | Connect TX and RX_mirror, point intersect with left plane |
| double_intersect_point_2 | Connect RX and TX_mirror, point intersect with right plane |
| distance_LOSPath | Distance from TX to RX directly |
| LOS  | Line Of Sight        |
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7) Looking for the file saved in the same folder, it will have a timeframe on it:

ray_tracing_double_bounce2023_07_28_14_48_06.mat (MAT...

Name	Value
Radio_Frequency_Of_Channel	3.2600e+11
Speed_Of_Light	299792458
TX_coordination	[-0.0050,0.2350,0.0380]
RX_coordination	[0.0040,0.2200,0]
RX_mirror_coordination	[-0.0380,0.2547,0.0107]
TX_mirror_coordination	[0.0212,0.2400,0.0035]
double_intersect_point_1	[-0.0094,0.2376,0.0343]
double_intersect_point_2	[0.0193,0.2379,0.0031]
distance_LOSPath	0.0418
distance_Double_Bounce_TX_i...	0.0063
distance_Double_Bounce_inte...	0.0425
distance_Double_Bounce_inte...	0.0238
timeOfArrival_LOSPath	1.3954e-10
timeOfArrival_SingleBounce	1.5739e-10
timeOfArrival_DoubleBounce	2.4194e-10
delay_spread_direct	1.6873e-20
delay_spread_single_bounce	1.2554e-20
delay_spread_double_bounce	7.5606e-22
RMS_delay_spread	1.7373e-10
AOI_double_bounce_on_left_...	46.3274
AOI_double_bounce_on_right...	55.1001
AOI_single_bounce_on_left_pl...	42.8063
Reflectance_double_bounce_...	0.0055
Reflectance_double_bounce_...	0.0690
Reflectance_single_bounce_o...	0.0451
permittvity_of_cardboard_at_...	0.1121
power_LOSPath	-55.1425
power_SingleBounce	-107.1105
power_DoubleBounce	-178.4300
Time_Stamp	datetime

8) Looking for the plot file on the entire process: