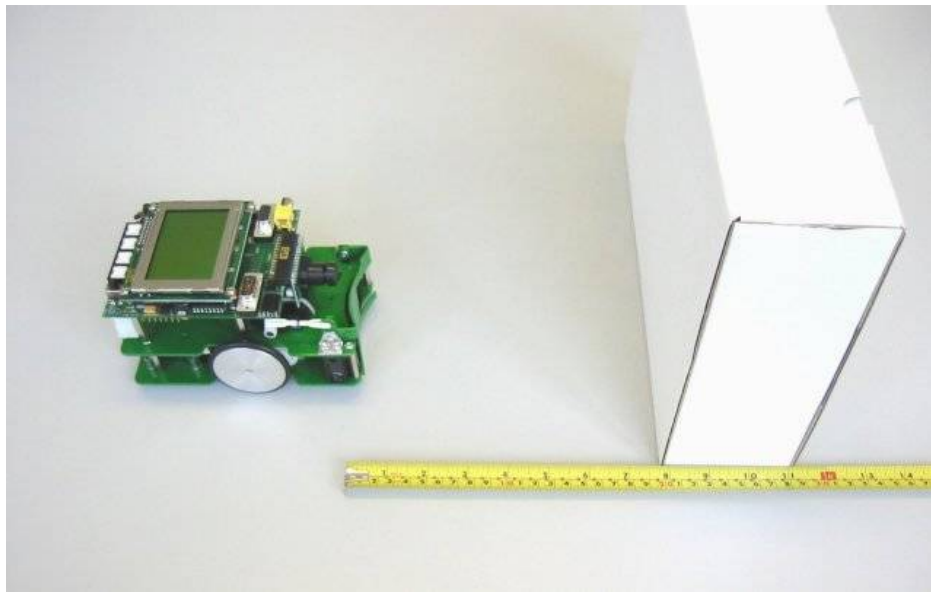

Generating Calibration Data for IR-Distance Sensors (PSDs)

Follow these steps to generate a Look-Up-Table (LUT) for each IR Distance Sensor (PSD) of your Robot.

1. Setup

Place a measuring tape and a movable target in front of the Sensor. Make sure the target is big (height!) enough to cover the complete IR beam.



2. Find Minimum Raw Distance

Select the HDT-Test function for the specific PSD and move the target back and forth to achieve minimal raw readings. This occurs normally at distances between 6 to 10 cm.

3. Take measurements

Starting at the minimum raw value, take readings at reasonable distances. E.g. each centimetre up to 25 cm and then every 5 cm up to a total distance of 70-80 cm.

Enter the distance/raw value-pairs in a measurement file like the example given below (FrontPSD.msm).

Make sure to enter distances (called "stage" in the file) in cm and with a dot as decimal delemiter. The raw value is entered as "psd".

```

<CalPSD max_range="70" steps="100" avg="3" sn="1" ParamStr="">
<Comment Text="Readings manually taken"/>
<LocalTime Date="20060606" Time="120000"/>
<User Name="Felix"/>
  <measurement no="1" stage="6.5" psd="12" />
  <measurement no="2" stage="8" psd="24" />
  <measurement no="3" stage="9" psd="37" />
  <measurement no="4" stage="10" psd="52" />
  <measurement no="5" stage="11" psd="63" />
  <measurement no="6" stage="12" psd="75" />
  <measurement no="7" stage="13" psd="84" />
  <measurement no="8" stage="14" psd="92" />
  <measurement no="9" stage="15" psd="100" />
  <measurement no="10" stage="16" psd="106" />
  <measurement no="11" stage="18" psd="116" />
  <measurement no="12" stage="20" psd="124" />
  <measurement no="13" stage="25" psd="139" />
  <measurement no="14" stage="30" psd="148" />
  <measurement no="15" stage="35" psd="155" />
  <measurement no="16" stage="40" psd="161" />
  <measurement no="17" stage="45" psd="165" />
  <measurement no="18" stage="50" psd="170" />
  <measurement no="19" stage="55" psd="172" />
  <measurement no="20" stage="60" psd="174" />
  <measurement no="21" stage="70" psd="179" />
</CalDRO>

```

4. Generate a look-up-table by running CalPSD.

Open a command shell, change to this example directory and enter

```
CalPSD cal FrontPSD
```

Note, that the suffix ".msm" is not entered!

5. Copy the LUT to your HDT

CalPSD generates a *.c file, which contains the Look-Up-Table as C-Source. This can be copied to the appropriate section of your HDT C-source file. Note, that the C-Source contains the distance values in millimetres. Compile the HDT, transfer it to the robot and check if the distance measurements are correct now.

If you want, you can also have a look at the generated *.cal file, which contains the LUT as row/distance pairs. You can use this to draw a plot of the LUT e.g. with GNUPlot or Excel. Note that the distance is given in centimetres and that 99.9 cm specifies "infinite" distance.

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