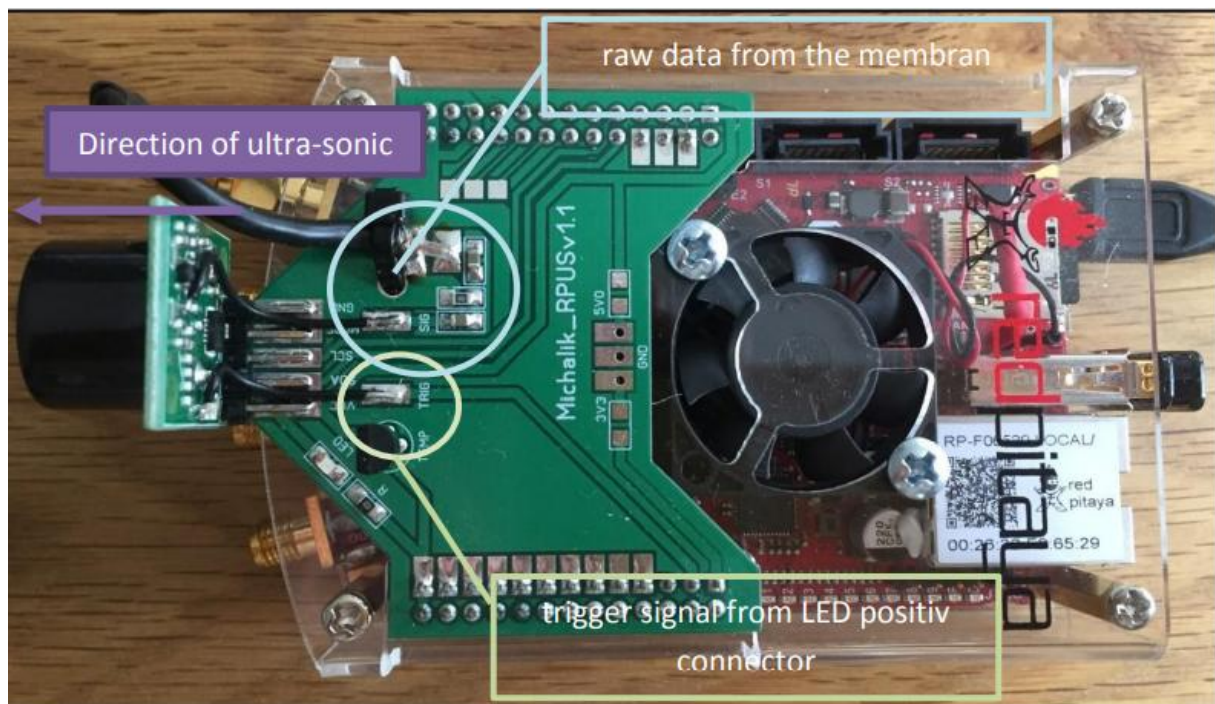
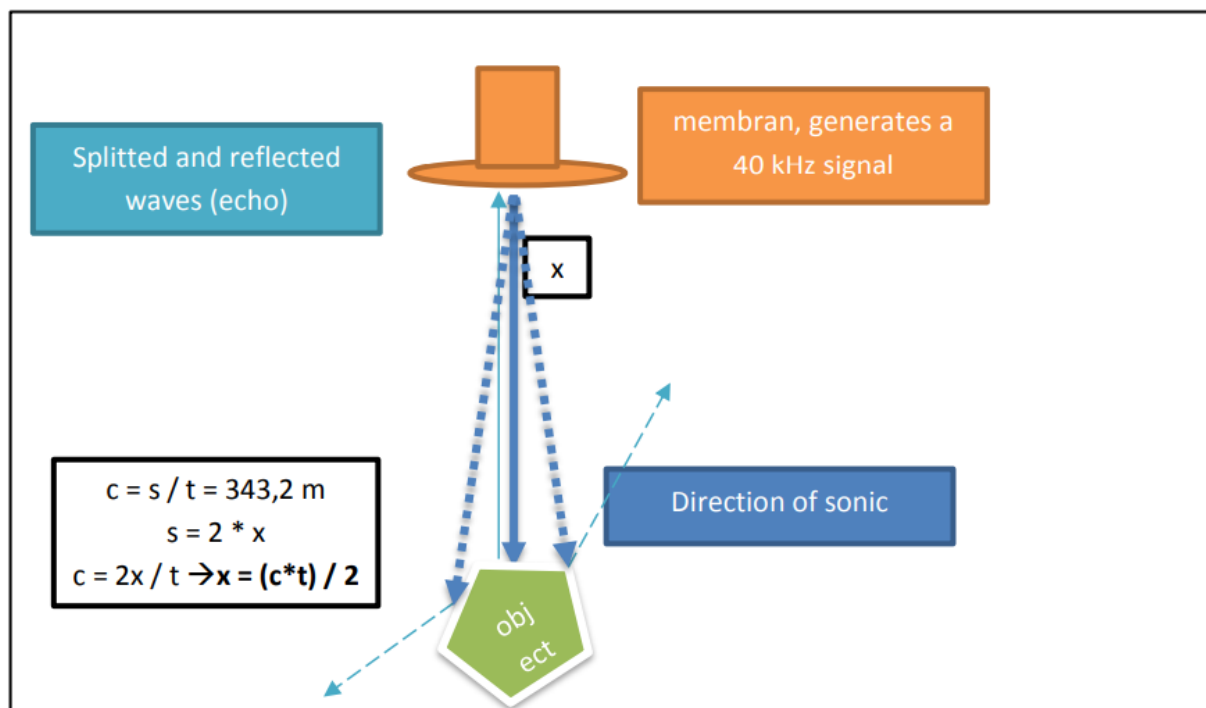


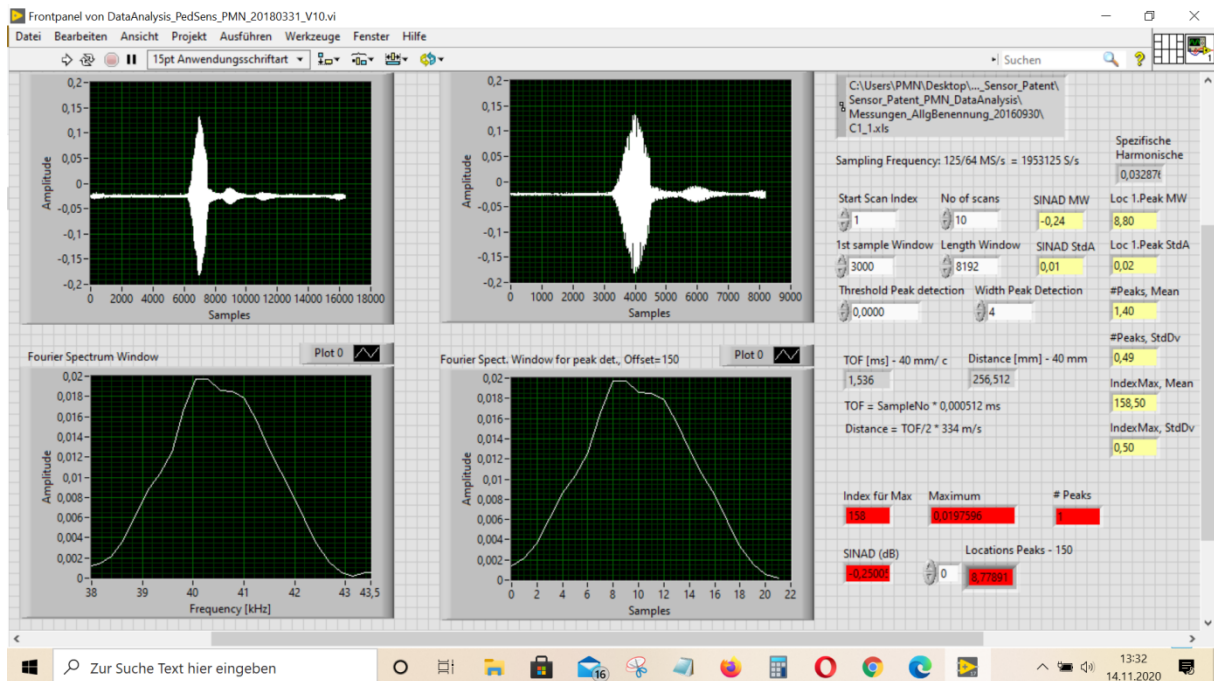
Hardware of Sensor



Ultrasonic Pulse Echo Method



Example of Data Processing HMI



Tools for Assessment of Features (among others):

Quality of Features

$$Q_i = \frac{(\mu_{1i} - \mu_{2i})^2}{s_{1i}^2 + s_{2i}^2}$$

1, 2: Index of classes, i: i-th Feature,
 μ : Mean (avarage), s^2 : Variance

Correlation Coefficient

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} = \frac{Cov(X,Y)}{s(X)s(Y)}$$

Tools for Assessment of Classifier (among others):

Diskriminanzdifferenz

$\Delta_D = (D_1 - D_2)^2 / (D_1 + D_2)^2$ with 1, 2: Index of classes

Konfusionsmatrix

	Actual Class 1	Actual Not Class 1
Predicted Class 1	True Positive (TP)	False Positive (FP)
Predicted Not Class 1	False Negative (FN)	True Negative (TN)

Elementary Functional Diagram of Data Processing of Sensor

