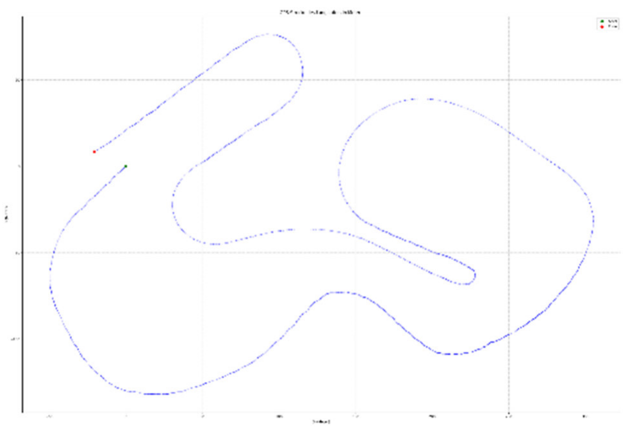
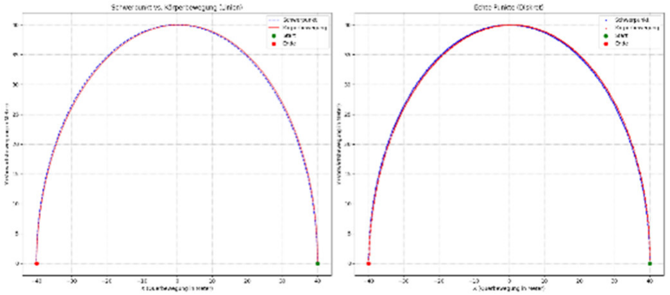
Nadine_1



Datensatz MB

R	Radius der Kreisbahn	40 m
V	Geschwindigkeit	20 m/s
ω	Winkelgeschwindigkeit	$\frac{V}{R} = \frac{20}{40} = 0.5$ rad/s
ω_{inner}	Frequenz der inneren Bewegung	$\frac{2\pi}{5}$ rad/s

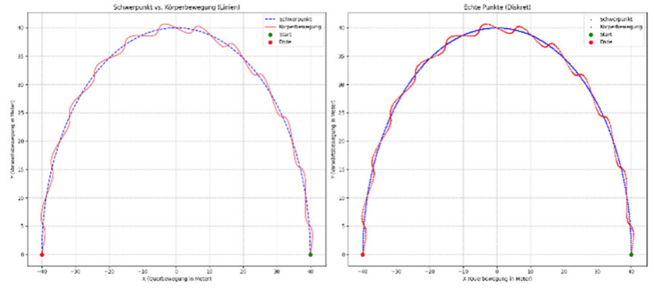
Schwerpunktbewegung (Kreisbahn)	$x_{\text{sp}}(t) = R\cos(\omega t)$
	$y_{\text{sp}}(t) = R\sin(\omega t)$
Bewegungsrichtung ϕ	$\phi(t) = \omega t$
Seitliche und vorwärtige Schwankungen	$x_{\text{LR}}(t) = 0.2\sin(\omega_{\text{inner}} t)$
	$y_{\text{vz}}(t) = 0.5\sin(\omega_{\text{inner}} t)$
Transformation in das globale Koordinatensystem	$x(t) = x_{\text{sp}} + x_{\text{LR}}\cos(\phi) - y_{\text{vz}}\sin(\phi)$
	$y(t) = y_{\text{sp}} + x_{\text{LR}}\sin(\phi) + y_{\text{vz}}\cos(\phi)$



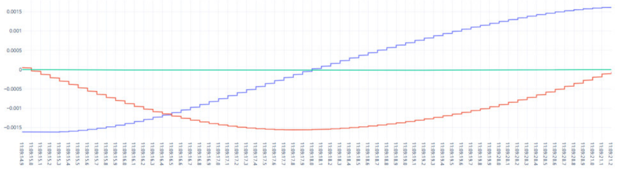
Datensatz Lof (Mehr Perioden)

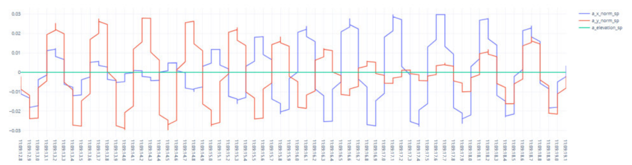
R	Radius der Kreisbahn	40 m
V	Geschwindigkeit	20 m/s
ω	Winkelgeschwindigkeit	$\frac{V}{R} = \frac{20}{40} = 0.5$ rad/s
A_{xLR}	Amplitude der seitlichen Bewegung	0.8
A_{yVZ}	Amplitude der Vorwärtsschwankung	1.0
ω_{inner}	Frequenz der inneren Bewegung	$\omega \times 24 = 12$ rad/s

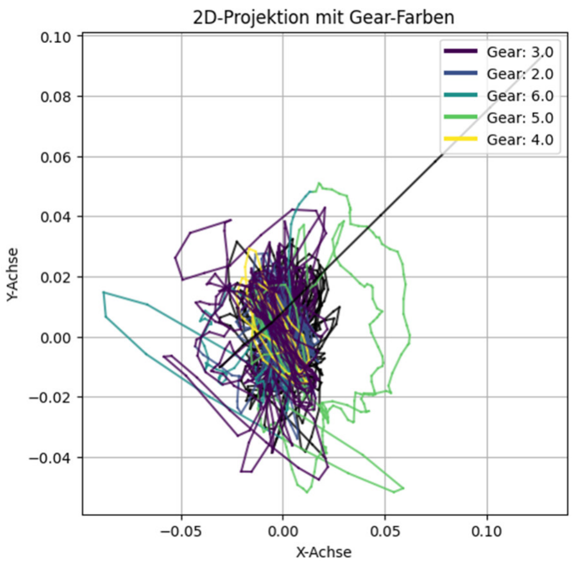
Schwerpunktbewegung (Kreisbahn)	$x_{\text{sp}}(t) = R\cos(\omega t)$
	$y_{\text{sp}}(t) = R\sin(\omega t)$
Bewegungsrichtung ϕ	$\phi(t) = \omega t$
Seitliche und vorwärtige Schwankungen	$x_{\text{LR}}(t) = A_{xLR}\sin(\omega_{\text{inner}} t)$
	$y_{\text{vz}}(t) = A_{yVZ}\sin(\omega_{\text{inner}} t)$
Transformation in das globale Koordinatensystem	$x(t) = x_{\text{sp}} + x_{\text{LR}}\cos(\phi) - y_{\text{vz}}\sin(\phi)$
	$y(t) = y_{\text{sp}} + x_{\text{LR}}\sin(\phi) + y_{\text{vz}}\cos(\phi)$

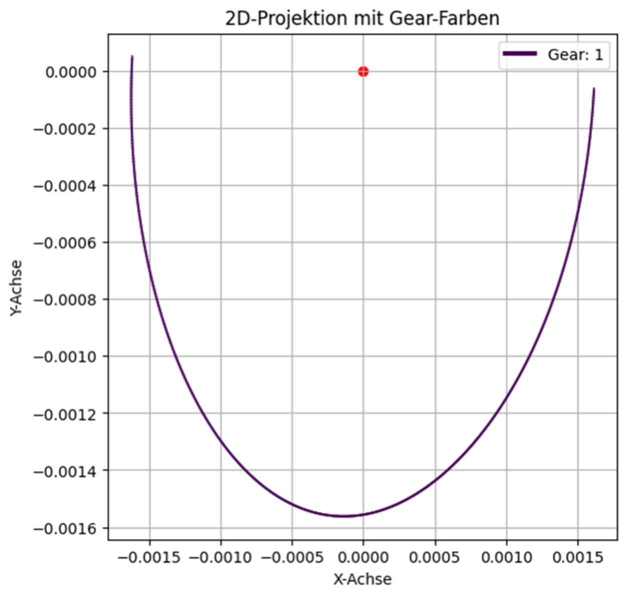


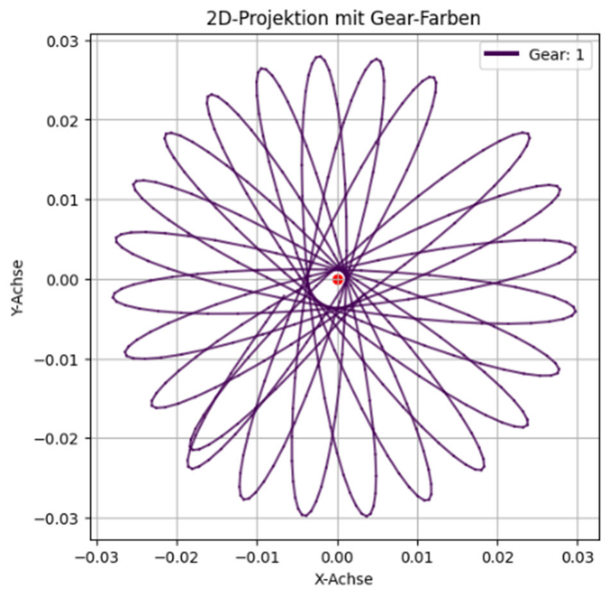
Gefilterte Beschleunigung (Savitzky-Golay-Filter 11/3)



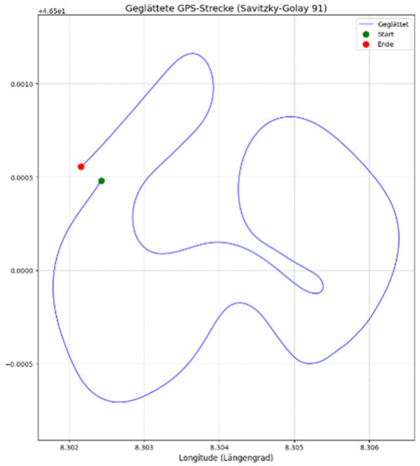


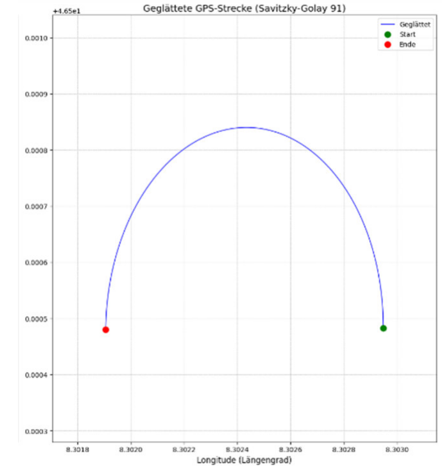

2D-Projektion mit Gear-Farben
Gear: 3.0
Gear: 2.0
Gear: 6.0
Gear: 5.0
Gear: 4.0
0.10
0.08
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.05
0.00
0.05
0.10
X-Achse
Y-Achse

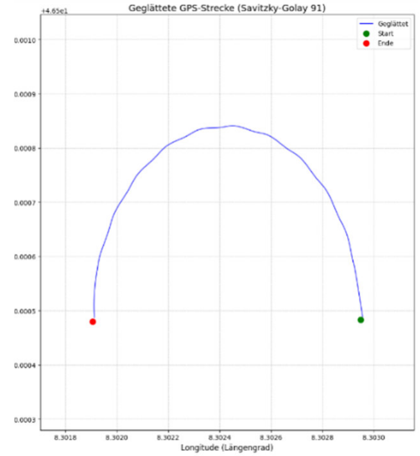

2D-Projektion mit Gear-Farben
Gear: 1
0.0000
−0.0002
−0.0004
−0.0006
−0.0008
−0.0010
−0.0012
−0.0014
−0.0016
−0.0015
−0.0010
−0.0005
0.0000
0.0005
0.0010
0.0015
X-Achse
Y-Achse


2D-Projektion mit Gear-Farben
Gear: 1
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.03
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
X-Achse
Y-Achse

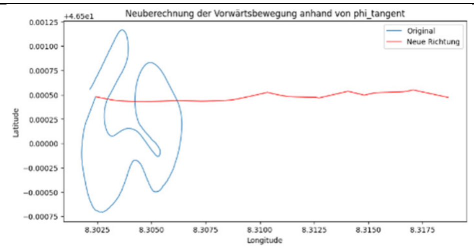
Kurve Glätten (Golay:91/3)

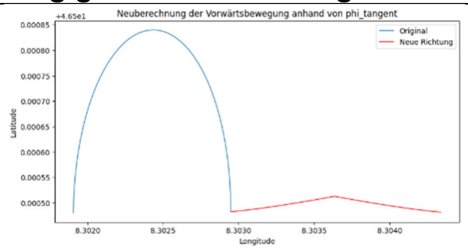


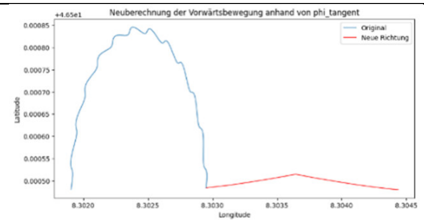


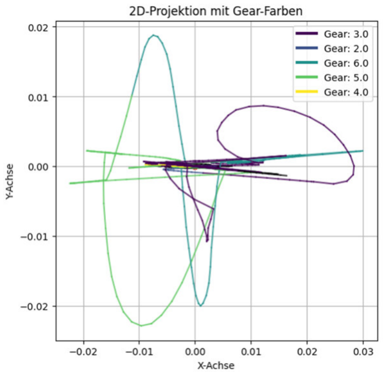


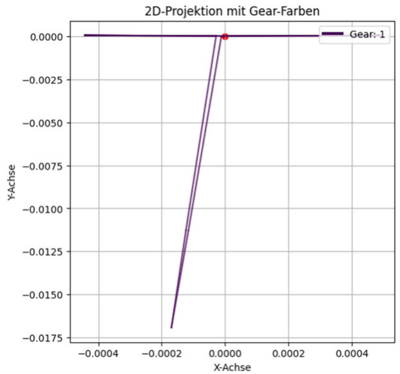
Weg glätten mit Phi Tangent

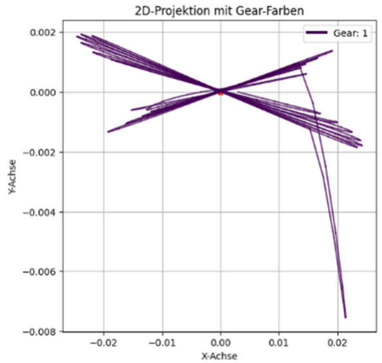




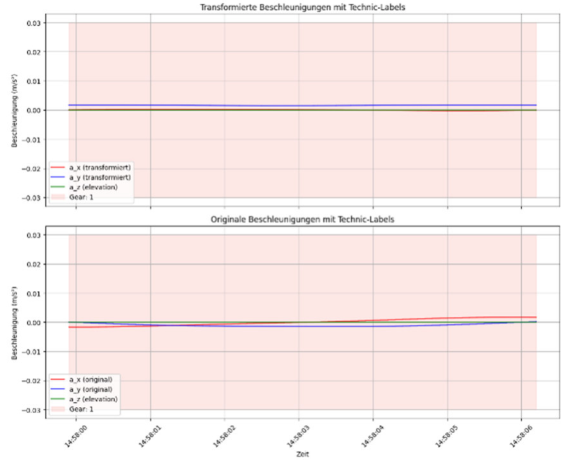


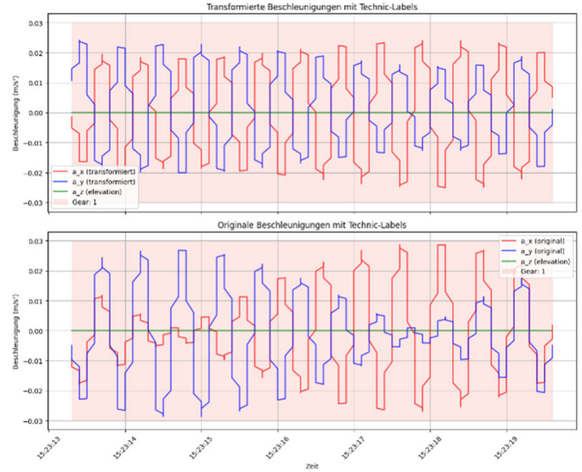


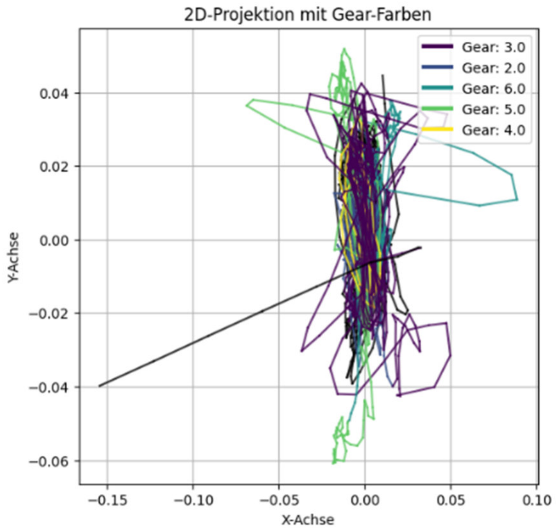


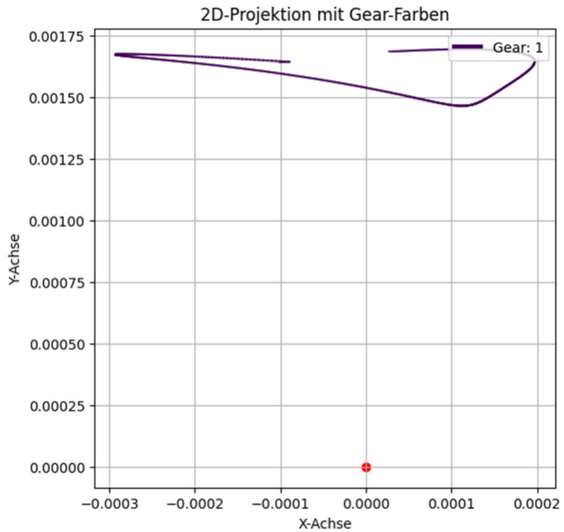


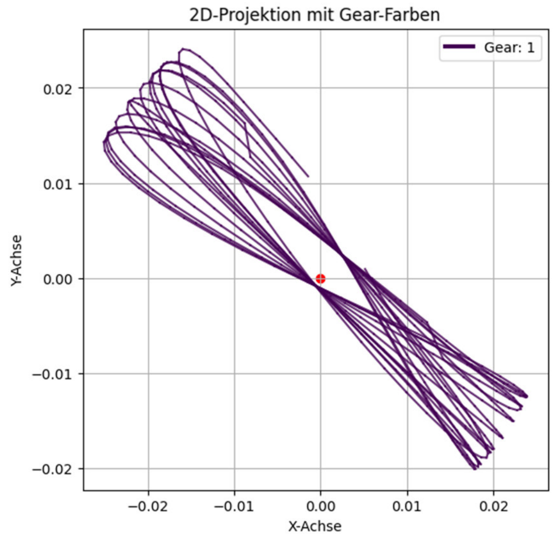
Beschleunigung glätten mit Phi Tangent











2 fache Ableitung von x_LR und y_vz

$$\ddot{x}_{LR}(t) = -A_{xLR}\omega_{\text{inner}}^2 \sin(\omega_{\text{inner}} t)$$

$$\ddot{y}_{vz}(t) = -A_{yVZ}\omega_{\text{inner}}^2 \sin(\omega_{\text{inner}} t)$$