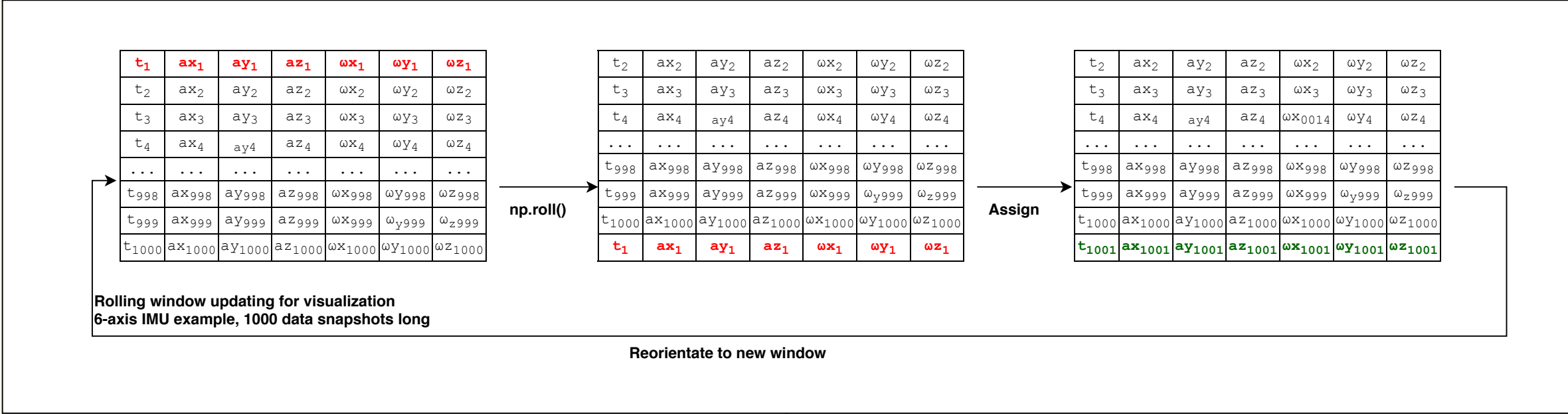**Laptop Data Visualization**
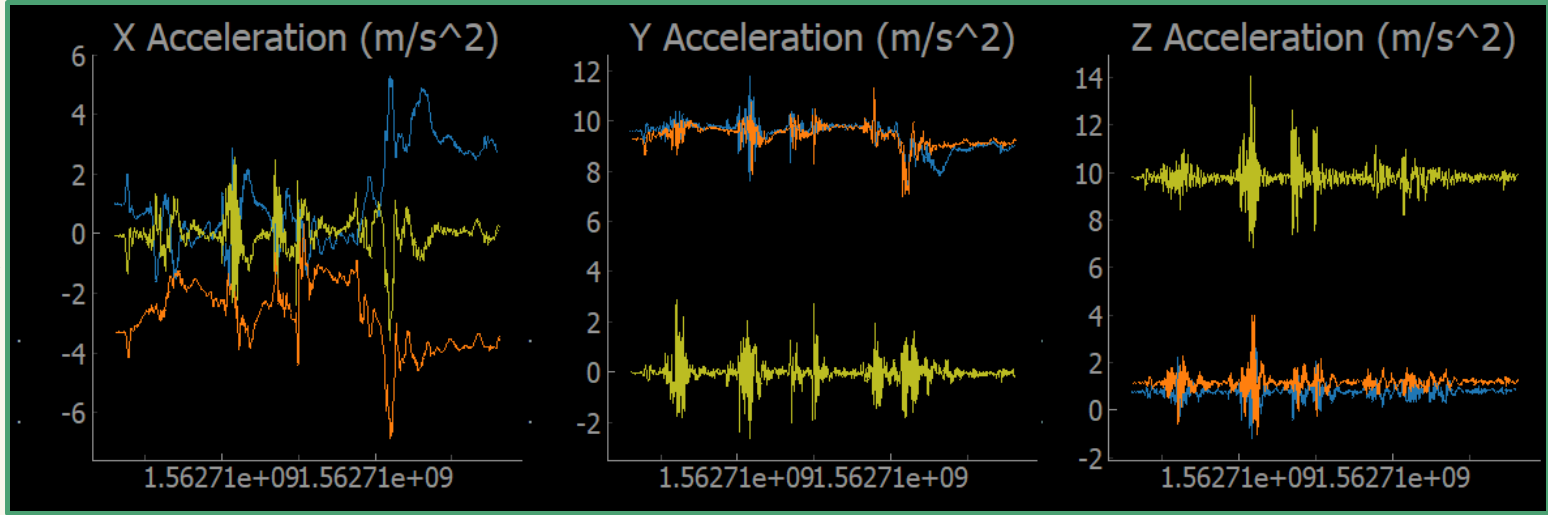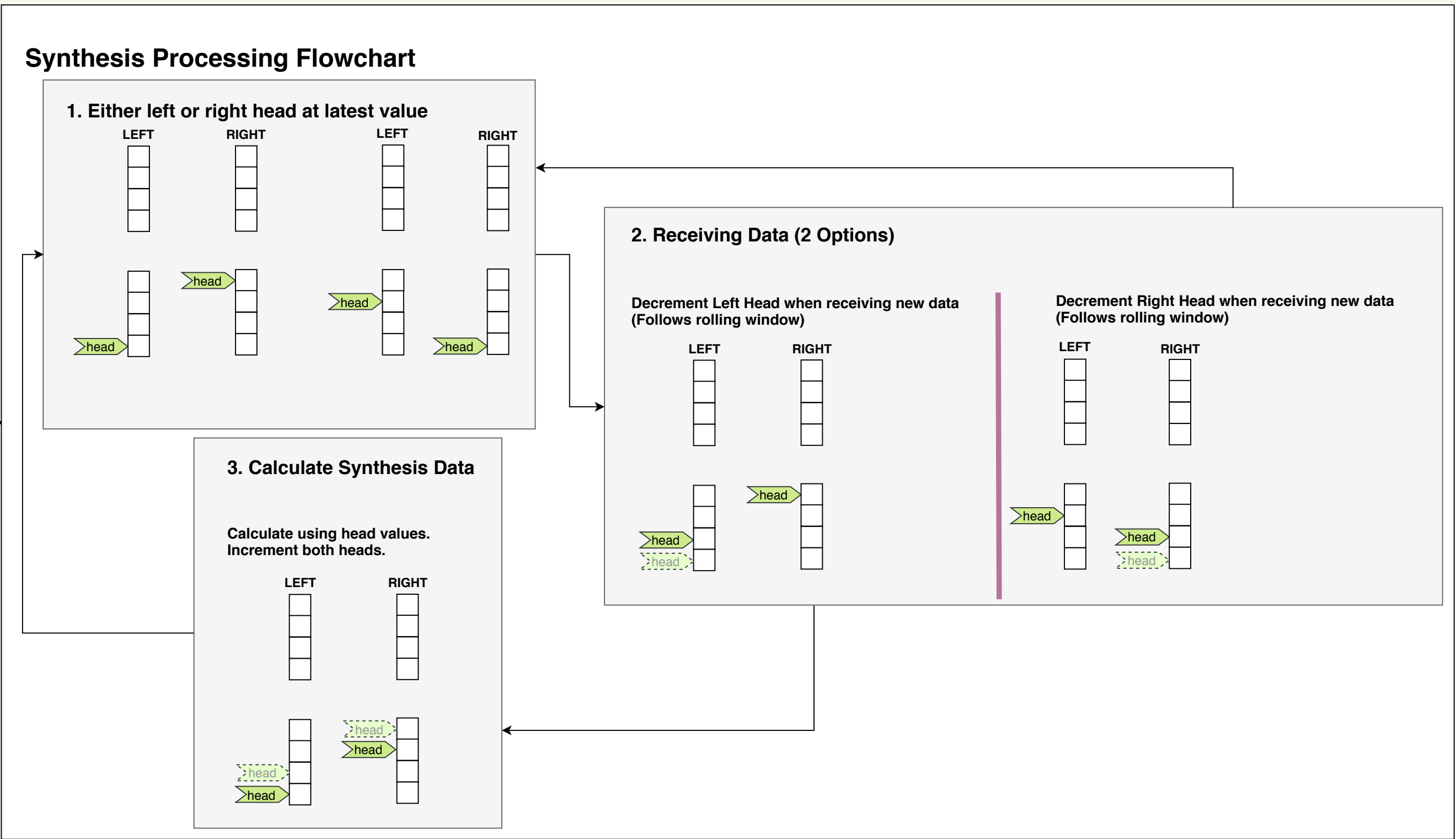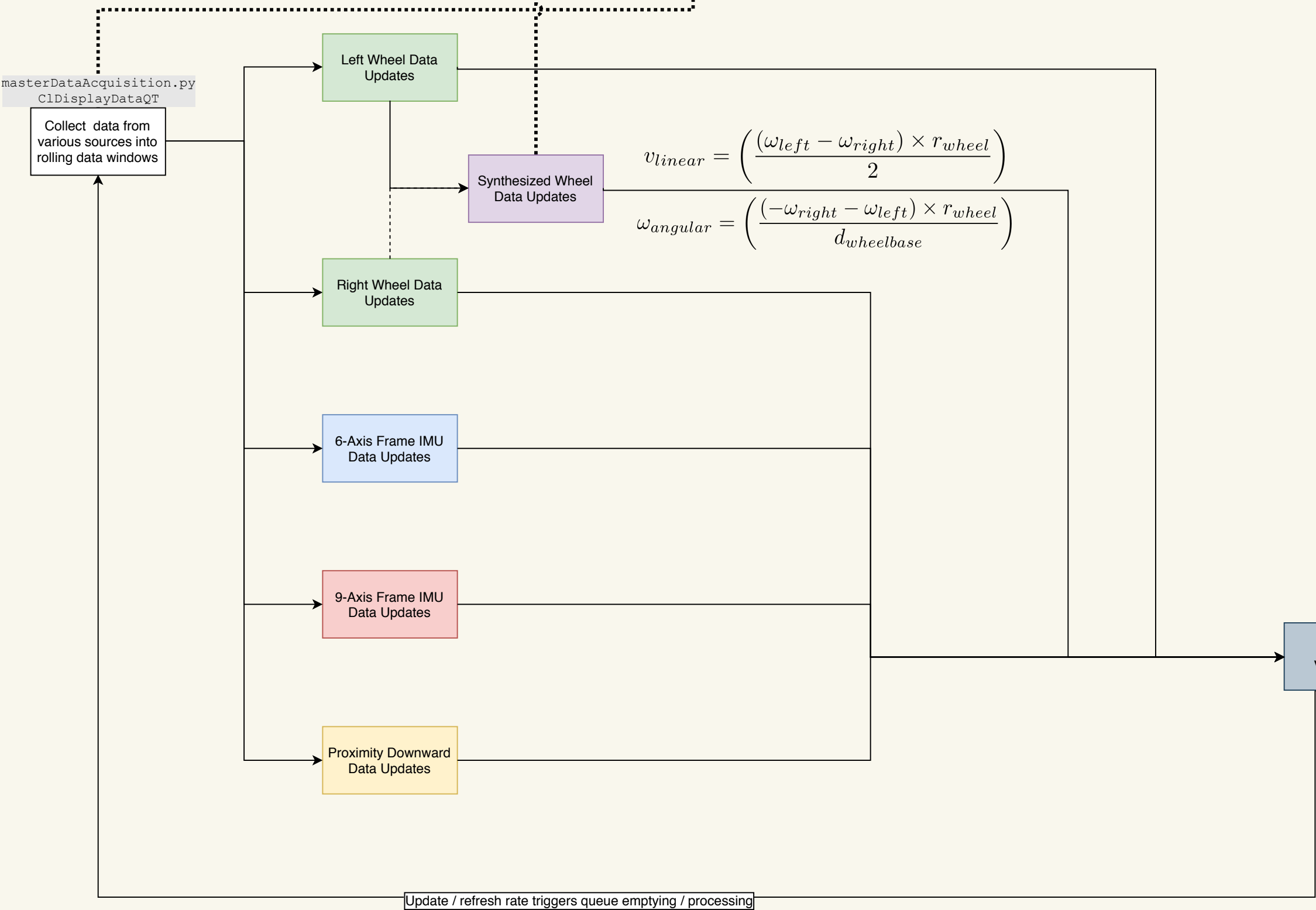
The remote laptop takes incoming information and plots that graph using a QT interface.

t_1	ax_1	ay_1	az_1	ωx_1	ωy_1	ωz_1
t_2	ax_2	ay_2	az_2	ωx_2	ωy_2	ωz_2
t_3	ax_3	ay_3	az_3	ωx_3	ωy_3	ωz_3
t_4	ax_4	$ay4$	az_4	ωx_4	ωy_4	ωz_4
...	...	...	...	...	...	...
t_{998}	ax_{998}	ay_{998}	az_{998}	ωx_{998}	ωy_{998}	ωz_{998}
t_{999}	ax_{999}	ay_{999}	az_{999}	ωx_{999}	ωy_{999}	ωz_{999}
t_{1000}	ax_{1000}	ay_{1000}	az_{1000}	ωx_{1000}	ωy_{1000}	ωz_{1000}

np.roll()

t_2	ax_2	ay_2	az_2	ωx_2	ωy_2	ωz_2
t_3	ax_3	ay_3	az_3	ωx_3	ωy_3	ωz_3
t_4	ax_4	$ay4$	az_4	ωx_4	ωy_4	ωz_4
...	...	...	...	...	...	...
t_{998}	ax_{998}	ay_{998}	az_{998}	ωx_{998}	ωy_{998}	ωz_{998}
t_{999}	ax_{999}	ay_{999}	az_{999}	ωx_{999}	ωy_{999}	ωz_{999}
t_{1000}	ax_{1000}	ay_{1000}	az_{1000}	ωx_{1000}	ωy_{1000}	ωz_{1000}
t_1	ax_1	ay_1	az_1	ωx_1	ωy_1	ωz_1

Assign

t_2	ax_2	ay_2	az_2	ωx_2	ωy_2	ωz_2
t_3	ax_3	ay_3	az_3	ωx_3	ωy_3	ωz_3
t_4	ax_4	$ay4$	az_4	ωx_{0014}	ωy_4	ωz_4
...	...	...	...	...	...	...
t_{998}	ax_{998}	ay_{998}	az_{998}	ωx_{998}	ωy_{998}	ωz_{998}
t_{999}	ax_{999}	ay_{999}	az_{999}	ωx_{999}	ωy_{999}	ωz_{999}
t_{1000}	ax_{1000}	ay_{1000}	az_{1000}	ωx_{1000}	ωy_{1000}	ωz_{1000}
t_{1001}	ax_{1001}	ay_{1001}	az_{1001}	ωx_{1001}	ωy_{1001}	ωz_{1001}

Rolling window updating for visualization
6-axis IMU example, 1000 data snapshots long

Reorientate to new window

Rolling Window Logic

masterDataAcquisition.py
ClDisplayDataQT

Collect data from various sources into rolling data windows

Left Wheel Data Updates

Synthesized Wheel Data Updates

$$v_{linear} = \left(\frac{(\omega_{left} - \omega_{right}) \times r_{wheel}}{2} \right)$$

$$\omega_{angular} = \left(\frac{(-\omega_{right} - \omega_{left}) \times r_{wheel}}{d_{wheelbase}} \right)$$

Right Wheel Data Updates

6-Axis Frame IMU Data Updates

9-Axis Frame IMU Data Updates

Proximity Downward Data Updates

PyQTGraph Visualization

Update / refresh rate triggers queue emptying / processing

Synthesis Processing Flowchart

1. Either left or right head at latest value

LEFT RIGHT LEFT RIGHT

head head head

2. Receiving Data (2 Options)

Decrement Left Head when receiving new data (Follows rolling window)

LEFT RIGHT

head head

Decrement Right Head when receiving new data (Follows rolling window)

LEFT RIGHT

head head head

3. Calculate Synthesis Data

Calculate using head values. Increment both heads.

LEFT RIGHT

head head
head head

X Acceleration (m/s^2) Y Acceleration (m/s^2) Z Acceleration (m/s^2)

1.56271e+09 1.56271e+09   1.56271e+09 1.56271e+09   1.56271e+09 1.56271e+09

Data Visualization Interface

Save Synthesis Data

terminated

If Terminated, Set False