Node Test: position_approximator_mecanum

Node test set up and prerequisites:

Rclcpp, geometry_msgs, colcon, gtest

Test1 : PublishesPositionVelocity
Tester : Rik van Velzen
Date : 30/11/2025

Short description test: Verifies that the node can receive a Mecanum message on its velocity topic without crashing. Functional check of subscription setup.
Input test: - Create a Mecanum message with all wheels at speed 1.0 - Assign a current timestamp - Publish on the node's velocity topic
Expected result : - The node receives the message (no crash occurs) - Subscriptions are functional
Result test: - Test didn't crash and msg is received by the node

Test2 : TestXMovement
Tester : Rik van Velzen
Date : 01/12/2025

Short description test: Verifies that the node can receive a Mecanum message on its velocity topic without crashing. And calculates the X axis. Functional check of subscription setup.
Start conditions: - Pose initialized at x=0, y=0, yaw_z=0 Input test: - First Mecanum message: wheels [-1.0, 1.0, 1.0, -1.0] (timestamp sync) - Second Mecanum message: same wheel speeds
Expected result : - Velocities: line is printed - Pose: line is printed

- x, y and yaw_z values are present - x and vx are non-zero after calculations and integration
Result test: - Logs contain velocity and pose lines - x ≠ 0, vx ≠ 0 - y = 0 and yaw_z = 0

Test3 : TestYMovement
Tester : Rik van Velzen
Date : 01/12/2025

Short description test: Verifies that the node can receive a Mecanum message on its velocity topic without crashing. And calculates the Y axis. Functional check of subscription setup.
Start conditions: - Pose initialized at x=0, y=0, yaw_z=0 Input test: - First Mecanum message: wheels [-1.0, 1.0, -1.0, 1.0] (timestamp sync) - Second Mecanum message: same wheel speeds
Expected result : - Velocities: line is printed - Pose: line is printed - x, y and yaw_z values are present - y and vy are non-zero after calculations and integration
Result test: - Logs contain velocity and pose lines - y ≠ 0, vy ≠ 0 - x = 0 and yaw_z = 0

Test4 : TestYaw_zMovement
Tester : Rik van Velzen
Date : 01/12/2025

Short description test: Verifies that the node can receive a Mecanum message on its velocity topic without crashing. And calculates the Yaw on the Z axis. Functional check of subscription setup.
Start conditions: - Pose initialized at x=0, y=0, yaw_z=0 Input test: - First Mecanum message: all wheels at 1.0 (timestamp sync)

- Second Mecanum message: same wheel speeds
Expected result : - Velocities: line is printed - Pose: line is printed - x, y and yaw_z values are present - yaw_z and yaw_vz are non-zero after calculations and integration
Result test: - Logs contain velocity and pose lines - yaw_z ≠ 0, yaw_vz ≠ 0 - x = 0 and y = 0

Test5 : NodePublishesPositionMessages
Tester : Rik van Velzen
Date : 03/12/2025

Short description test: Verifies that PositionData messages are published by the node after processing mecanum input. Functional check of publisher/subscriber integration.
Start conditions: - Subscriber initialized to catch PositionData messages - Pose initialized at x=0, y=0, yaw_z=0 Input test: - First Mecanum message: all wheels 0.0 (timestamp sync) - Wait 1 second - Second message: same wheel speeds (triggers actual publish) - Spin executor to allow subscriber to receive the message
Expected result : - Subscriber receives PositionData message - pos_received_ flag set to true - Position values are available in last_pos_msg_
Result test: - pos_received_ = TRUE - position values are available on the topic - subscriber received PositionData msg

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rik@IdeaPad-5-Pro:~/rmb_ws$ ./build/g425_assign4_pkg/utest_position_approximator_mecanum
[==========] Running 5 tests from 1 test suite.
[----------] Global test environment set-up.
[----------] 5 tests from MecanumPositionTest
[ RUN      ] MecanumPositionTest.NodeReceivesMecanumMessage
[INFO] [1764778661.805480511] [position_approximator_mecanum_node]: position_approximator_mecanum_node active.
[INFO] [1764778661.805952378] [position_approximator_mecanum_node]: Received first message – timestamps synced.
[       OK ] MecanumPositionTest.NodeReceivesMecanumMessage (14 ms)
[ RUN      ] MecanumPositionTest.TestXMovement
[INFO] [1764778661.811389364] [position_approximator_mecanum_node]: position_approximator_mecanum_node active.
[INFO] [1764778661.811688213] [position_approximator_mecanum_node]: Received first message – timestamps synced.
[INFO] [1764778662.812056817] [position_approximator_mecanum_node]: Velocities: vx=0.05 m/s, vy=0.00 m/s, yaw_vz=0.00 rad/s
[INFO] [1764778662.812209247] [position_approximator_mecanum_node]: Pose: x=0.05 m, y=0.00 m, yaw_z=0.00 rad (dt=1.000 s)
[       OK ] MecanumPositionTest.TestXMovement (1008 ms)
[ RUN      ] MecanumPositionTest.TestYMovement
[INFO] [1764778662.821093336] [position_approximator_mecanum_node]: position_approximator_mecanum_node active.
[INFO] [1764778662.821497515] [position_approximator_mecanum_node]: Received first message – timestamps synced.
[INFO] [1764778663.822046346] [position_approximator_mecanum_node]: Velocities: vx=0.00 m/s, vy=0.05 m/s, yaw_vz=0.00 rad/s
[INFO] [1764778663.822161074] [position_approximator_mecanum_node]: Pose: x=0.00 m, y=0.05 m, yaw_z=0.00 rad (dt=1.001 s)
[       OK ] MecanumPositionTest.TestYMovement (1010 ms)
[ RUN      ] MecanumPositionTest.TestYaw_zMovement
[INFO] [1764778663.830988155] [position_approximator_mecanum_node]: position_approximator_mecanum_node active.
[INFO] [1764778663.831380601] [position_approximator_mecanum_node]: Received first message – timestamps synced.
[INFO] [1764778664.832107222] [position_approximator_mecanum_node]: Velocities: vx=0.00 m/s, vy=0.00 m/s, yaw_vz=0.10 rad/s
[INFO] [1764778664.832283948] [position_approximator_mecanum_node]: Pose: x=0.00 m, y=0.00 m, yaw_z=0.10 rad (dt=1.001 s)
[       OK ] MecanumPositionTest.TestYaw_zMovement (1010 ms)
[ RUN      ] MecanumPositionTest.NodePublishesPositionMessages
[INFO] [1764778664.841284208] [position_approximator_mecanum_node]: position_approximator_mecanum_node active.
[INFO] [1764778664.841674781] [position_approximator_mecanum_node]: Received first message – timestamps synced.
[INFO] [1764778665.841837895] [position_approximator_mecanum_node]: Velocities: vx=0.00 m/s, vy=0.00 m/s, yaw_vz=0.00 rad/s
[INFO] [1764778665.841967231] [position_approximator_mecanum_node]: Pose: x=0.00 m, y=0.00 m, yaw_z=0.00 rad (dt=1.000 s)
[       OK ] MecanumPositionTest.NodePublishesPositionMessages (1010 ms)
[----------] 5 tests from MecanumPositionTest (4053 ms total)

[----------] Global test environment tear-down
[==========] 5 tests from 1 test suite ran. (4053 ms total)
[  PASSED  ] 5 tests.
```