

ROS 2-Based Autonomous Lawn Mower Simulation

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Introduction

What?

An autonomous lawn mower, built and validated entirely in simulation on ROS 2 — it records a lawn boundary, plans a full mowing path, and pauses for objects in its way.

Why?

- Mowing is still mostly manual (backpack / push / ride-on)
- Buried-wire robots: reliable boundary, but slow to install, fragile, hard to scale
- Boundary-free robots are rising — define the area in software (e.g. OpenMower)

Implementation

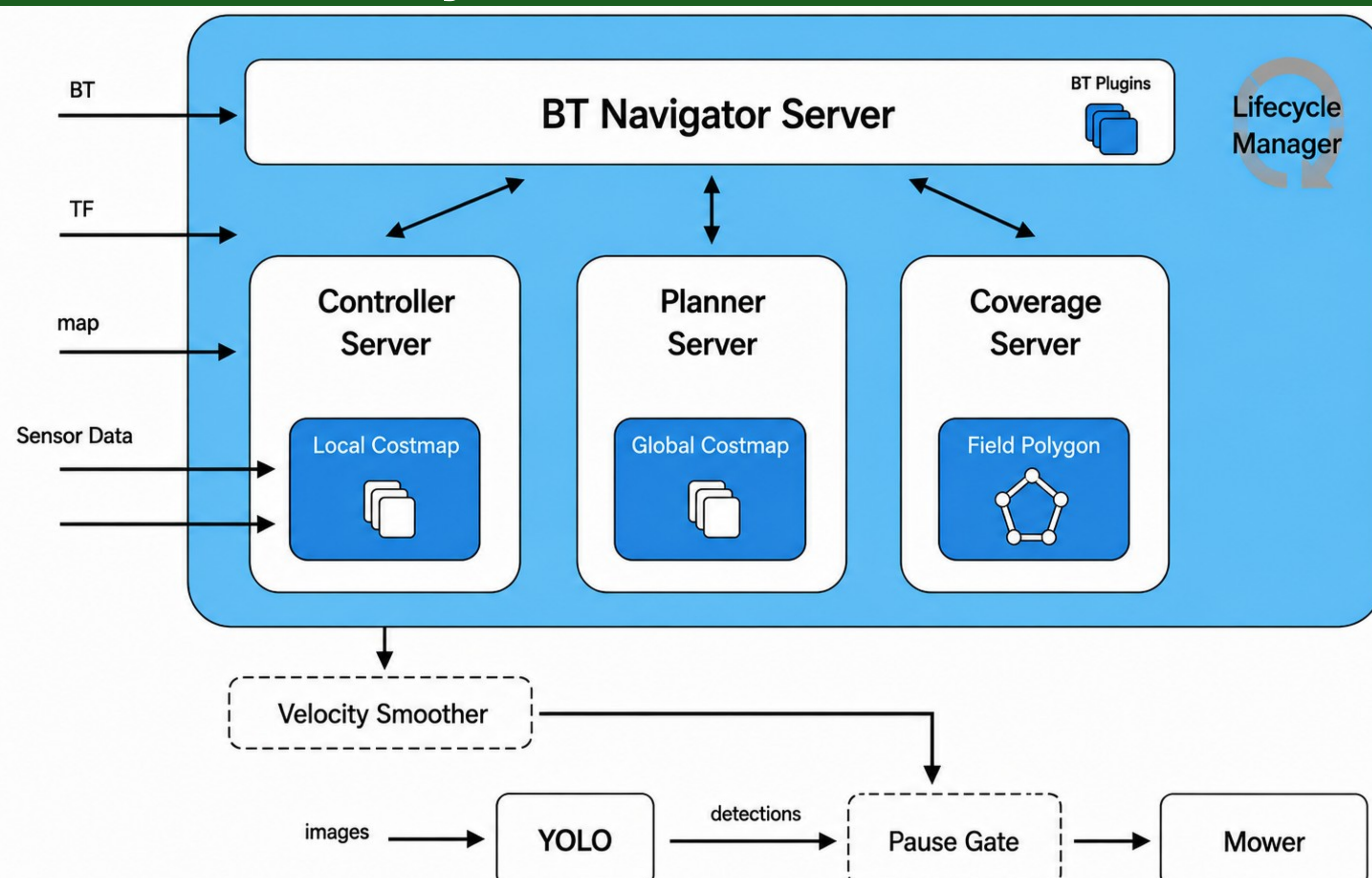
Built on:

- **ROS 2** — robot software framework
- **Gazebo** — 3D physics simulator
- **Nav2** — navigation stack
- **opennav_coverage** — coverage path planning
- **YOLO** — object detection

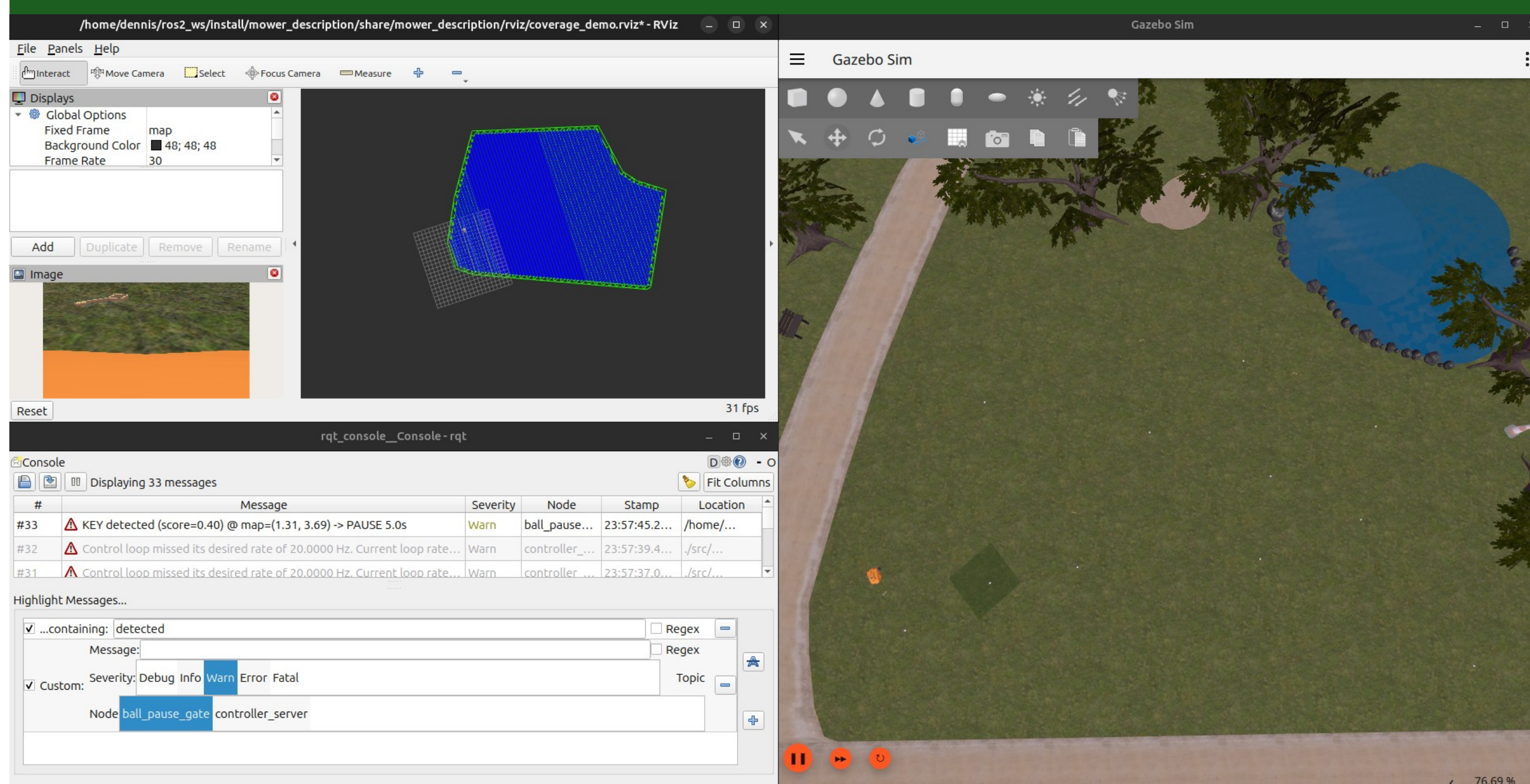
Why not just use OpenMower?

- Prior work (OpenMower) is ROS 1
- I built the first working ROS 2 version
- Integration needs deep ROS 2 knowledge

System Architecture



Results



Features:

- **Boundary recording** — joystick-drawn polygon in RViz
- **Coverage path** — back-and-forth swaths filling the area
- **Object detection** — YOLO bounding box → mower stops
- Full run — records → plans → mows the whole lawn in simulation

Future Work

- **Smarter areas** — concave boundaries & obstacle cut-outs (skip flower beds, trees)
- **Animal-aware safety** — depth camera: pause for animals nearby, resume when they leave
- **Sim-to-real** — deploy onto real hardware (e.g. OpenMower, RTK-equipped) for cm-level localization

Demo Video

