AUTHOR

TEAM ROBOQUEENS:MOBILE PLATFORM
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TEAM ATOM:NAVIGATION
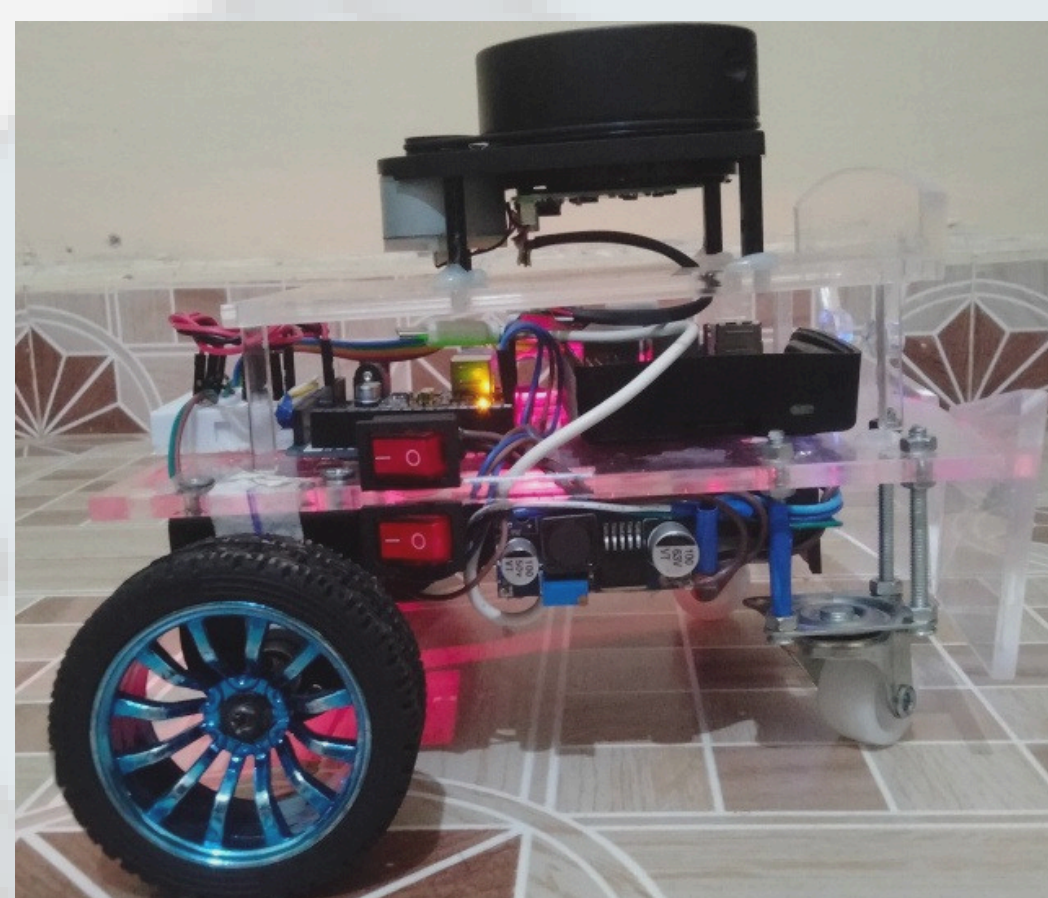*Kings Munene, Samuel Muchiri, Daniel Maithya, Kelvine Chweya.*

Atom x Queens

Innovation Unleashed!

## JOINT TEAM 2

AFFILIATIONS

1. Introduction

- This project aims to develop a differential drive robot inspired by Atom from Real Steel, utilizing modular platforms for enhanced mobility, navigation, and power supply
- The robot will utilize LiDar to gather environmental data, allowing it to make informed decisions about its path.


Fully assembled Robot

03. Methodology

- Mechanical design (Onshape)
- URDF Design & Simulation
- Hardware Integration
- Software and control development (ROS)
- Hardware & Software integration
- Calibration & Tuning
- Autonomus navigation & Testing

6.Hardware Overview

RP Lidar

- Provides detailed distance measurements, critical for mapping

- Quad-core ARM processor, capable of running ROS and controlling the system in real-time.

Raspberry Pi 4

Arduino Mega 2560

- Drives the motors using PWM, based on the commands from ROS running on the Pi.

07. Conclusion

The project demonstrates the feasibility of using a differential drive system in robotics, paving the way for advanced navigation and obstacle avoidance capabilities.

Final Mobile platform Robot.

02. Objectives

1.Develop a fully autonomous robot capable of efficiently navigating a predefined game field while detecting and avoiding obstacles in real-time.
2. To enhance the robot's maneuverability and adaptability, ensuring it can complete designated tasks while maintaining a smooth trajectory and minimizing collisions.
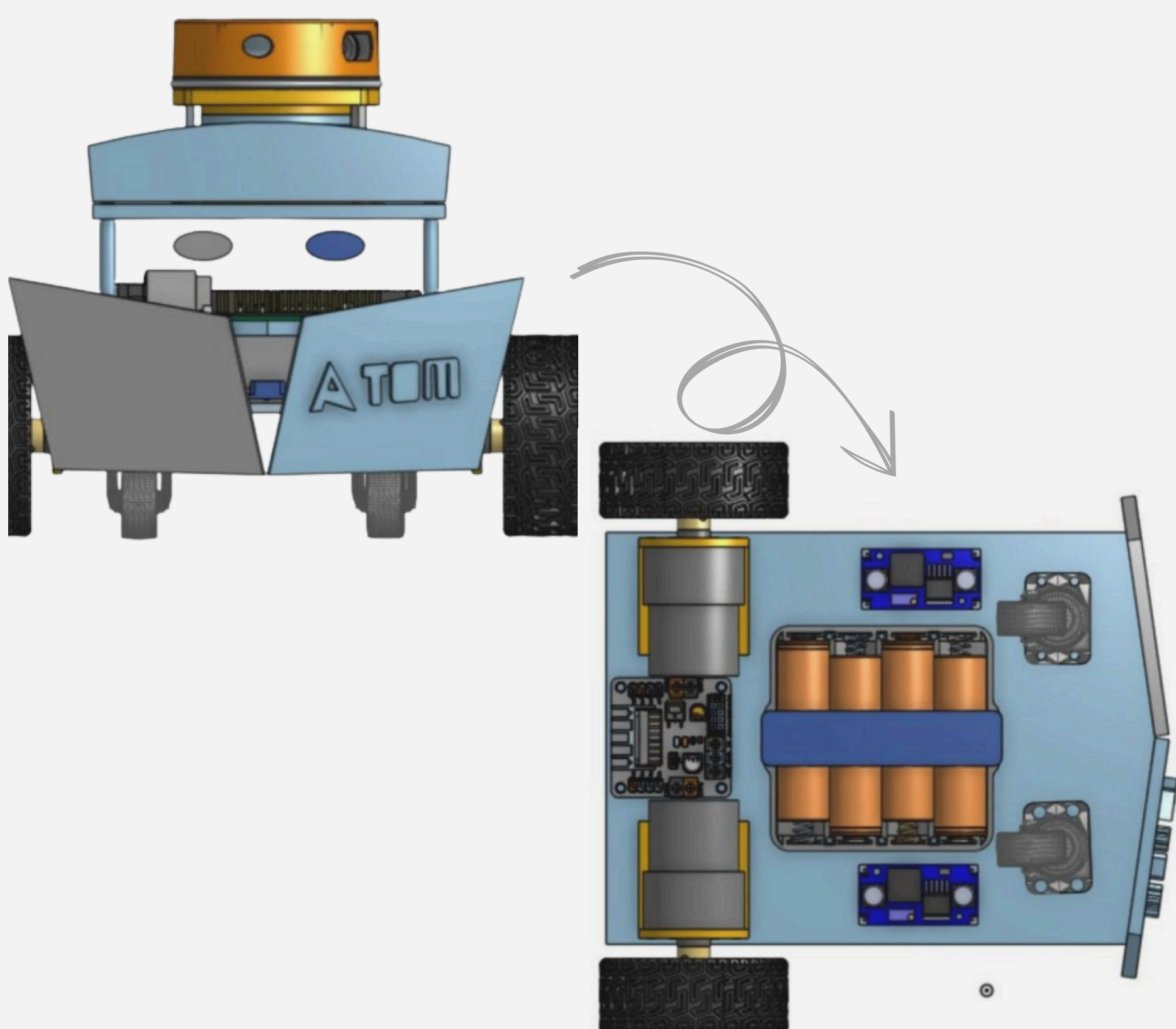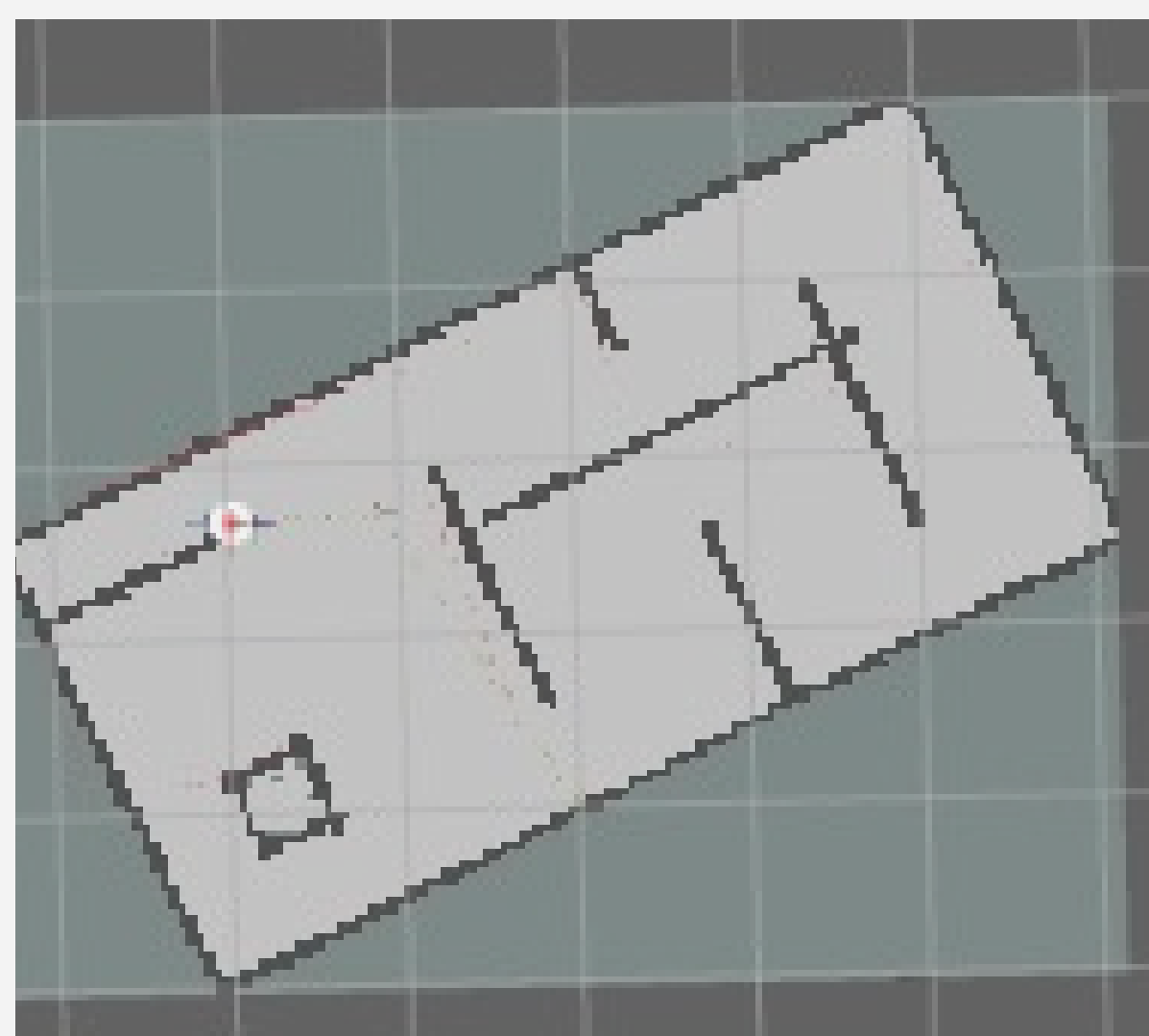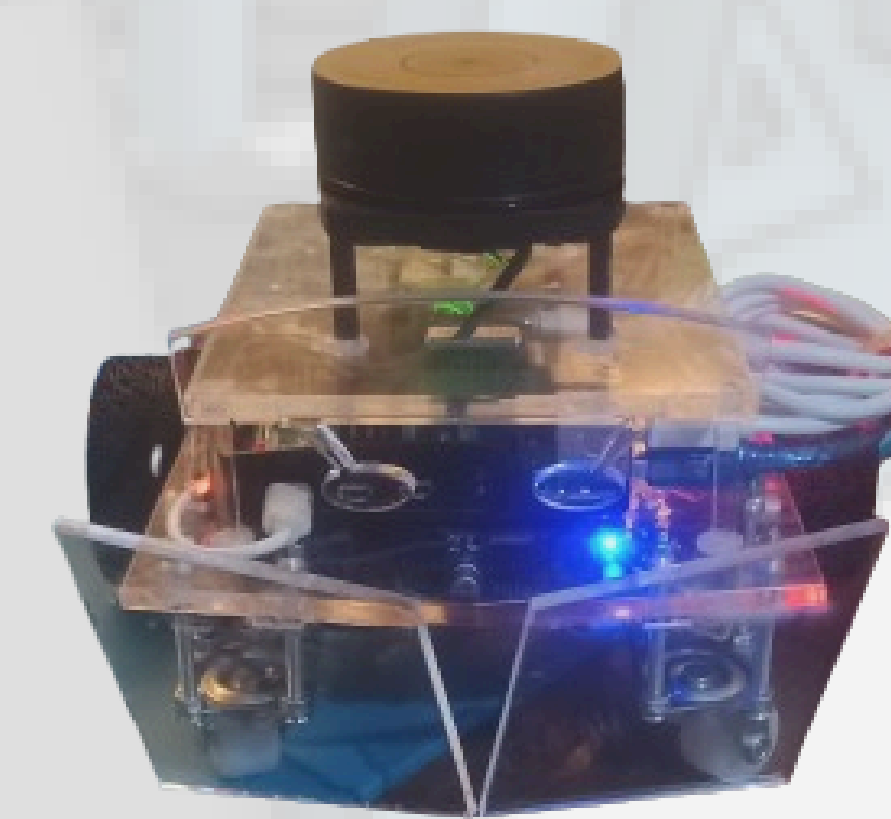

Robot CAD design
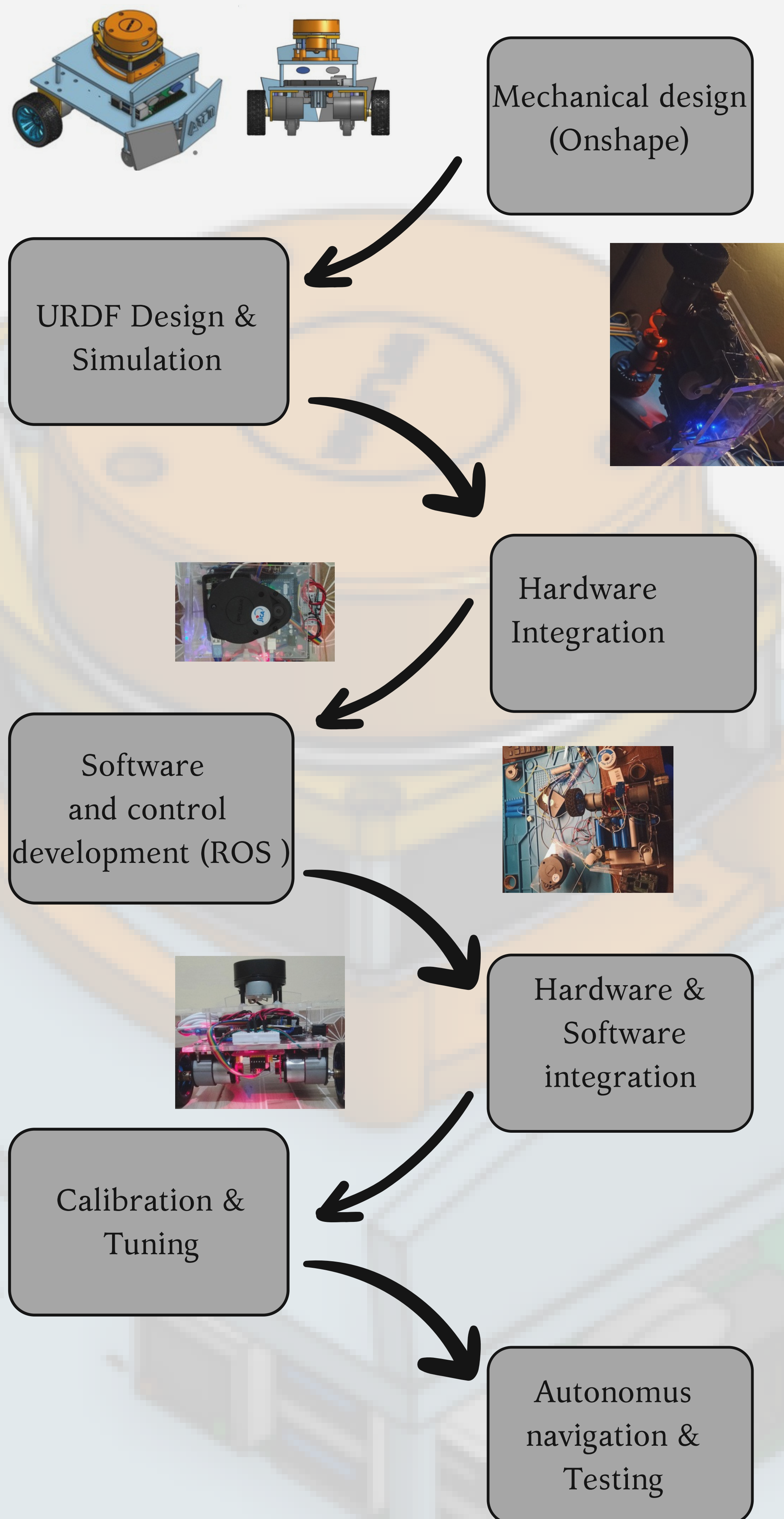
05. Analysis and Findings

SLAM Accuracy: Effective integration of LIDAR and odometry.

- **Obstacle Avoidance**: LIDAR and ROS enabled real-time detection.
- **Path Planning**: Efficient use of ROS move_base.
- **Differential Drive**: PD control and encoder feedback ensured precision.
- **System Integration**: Pi 4 managed computation, Arduino handled motors.

SLAM navigation result

- The main Skills earned from the design of our Robot are
  - i. **Modular Design**
  - ii. **Robotics Design**
  - iii. **Sensor Data Use**
  - iv. **Control Systems**
  - v. **Navigation & SLAM**
  - vi. **Power Management**
  - vii. **Programming**
  - viii. **Design Balance**