# MOBOTRICKS

## Intermediate Level Development Board for Robot Navigation

MOBOTRICKS

There are no wrong turnings

# Overview

- **Robot localization** denotes the robot's ability to establish its own position and orientation within the frame of reference.
- Navigation can be defined as the combination of the three fundamental competences:
  1. Self-localisation
  2. Path planning
  3. Map-building and map interpretation
- The intended outcome of this project is to design and develop a device for tracking and navigation of a mobile robot with respect to a given starting point.

# Existing Solutions

- Position
  - Robot Odometry
  - GPS
  - LIDAR
  - LORA
- Orientation
  - Gyroscope / accelerometers
  - Magnetometer
  - Dual GPS (Research level)

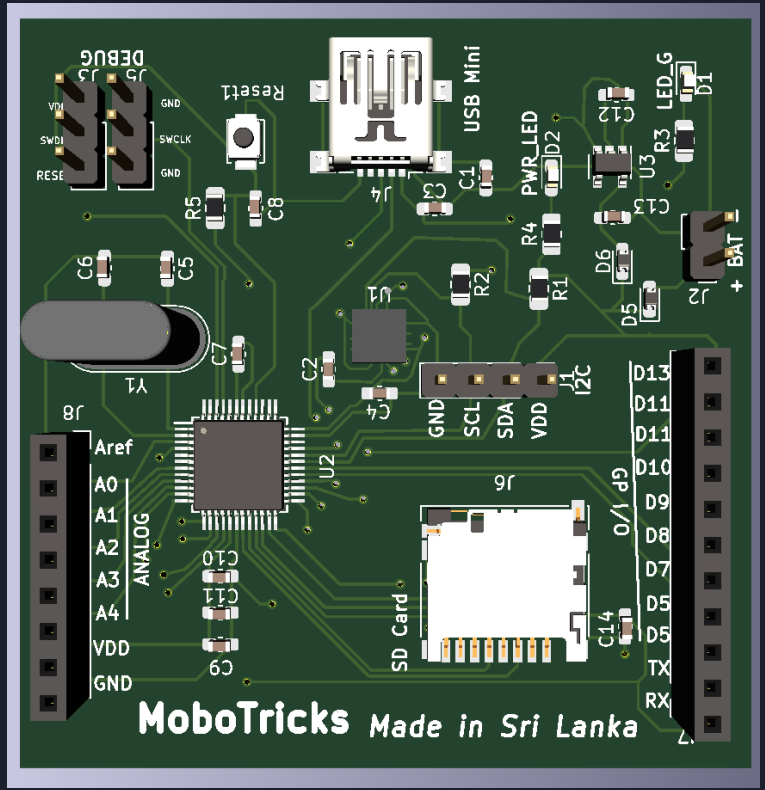
# MOBOTRICKS

An intermediate level development board for mobile robot applications capable of

- Navigation
- Tracking
- Rapid prototyping

# Concept

- Use of IMU sensors and position modules to get orientation and position measurements
- Sensor fusion,kalman filtering and low pass filtering to achieve a high level of accuracy
- Obtaining  velocity, acceleration, angular velocity and error rate as secondary outputs



# Key features

- Ability to connect external position measuring modules through I2C and SPI ports
- Inbuilt SD card to store data to be used for applications where real time tracking is difficult
- Inbuilt serial port for data transmission where bluetooth, wifi or RF modules can be connected depending on the application
- Mobile application to read and analyze output data

# Why MOBOTRICKS?

- High board clock speed (nearly 32MHz)  which makes real time tracking possible
- High accuracy of angle measurements with 9DOF
- Ability to use  in any type of robot both outdoors and indoors
- Competitive price point with the available market solutions
- Low space consumption
- User friendly
- Durable

# Target audience and applications

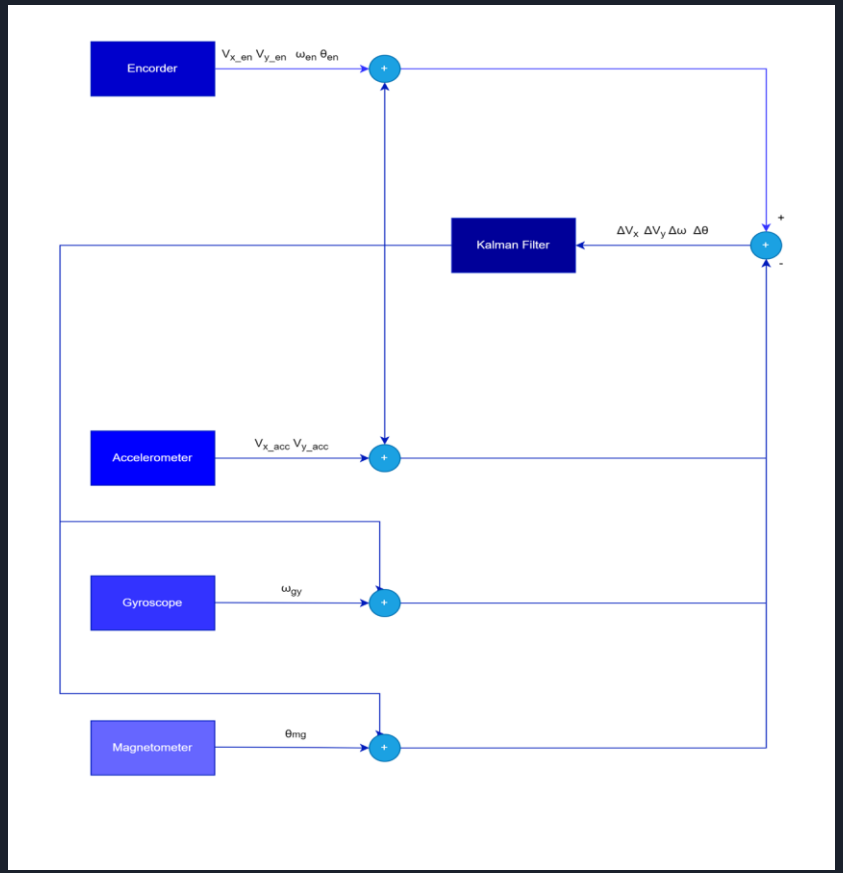
- Mobotricks will be an ideal solution for **robot developers** for
  - Rapid prototyping of mobile robots
  - Real time 2D orientation and position measurement
  - Analysing the navigation of a mobile robot with stored data
  - Obtaining acceleration and velocity measurement
  - Ability to adapt according to the application and external conditions

# Setting up MOBOTRICKS

- After purchasing the development board the user needs to install the mobile application issued along with the board to their device.
- Then depending on the application position measuring module have to be connected to the board.
- The user can obtain the output measurements by connecting the board to the application via the output module.

# Procedure

1. Planning
2. Software Designing using KICAD
3. Programming

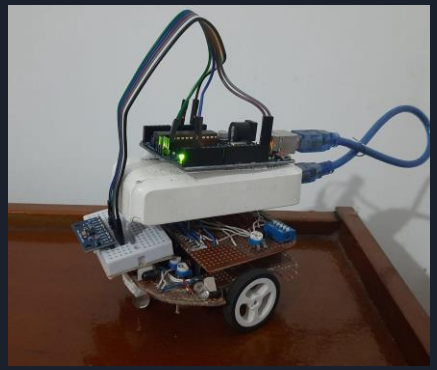


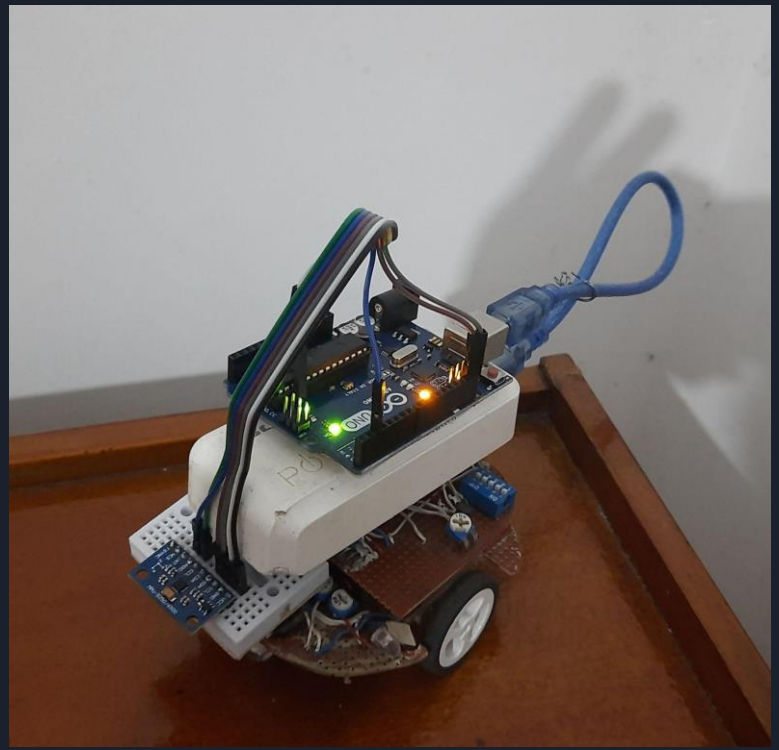
# Procedure cont..

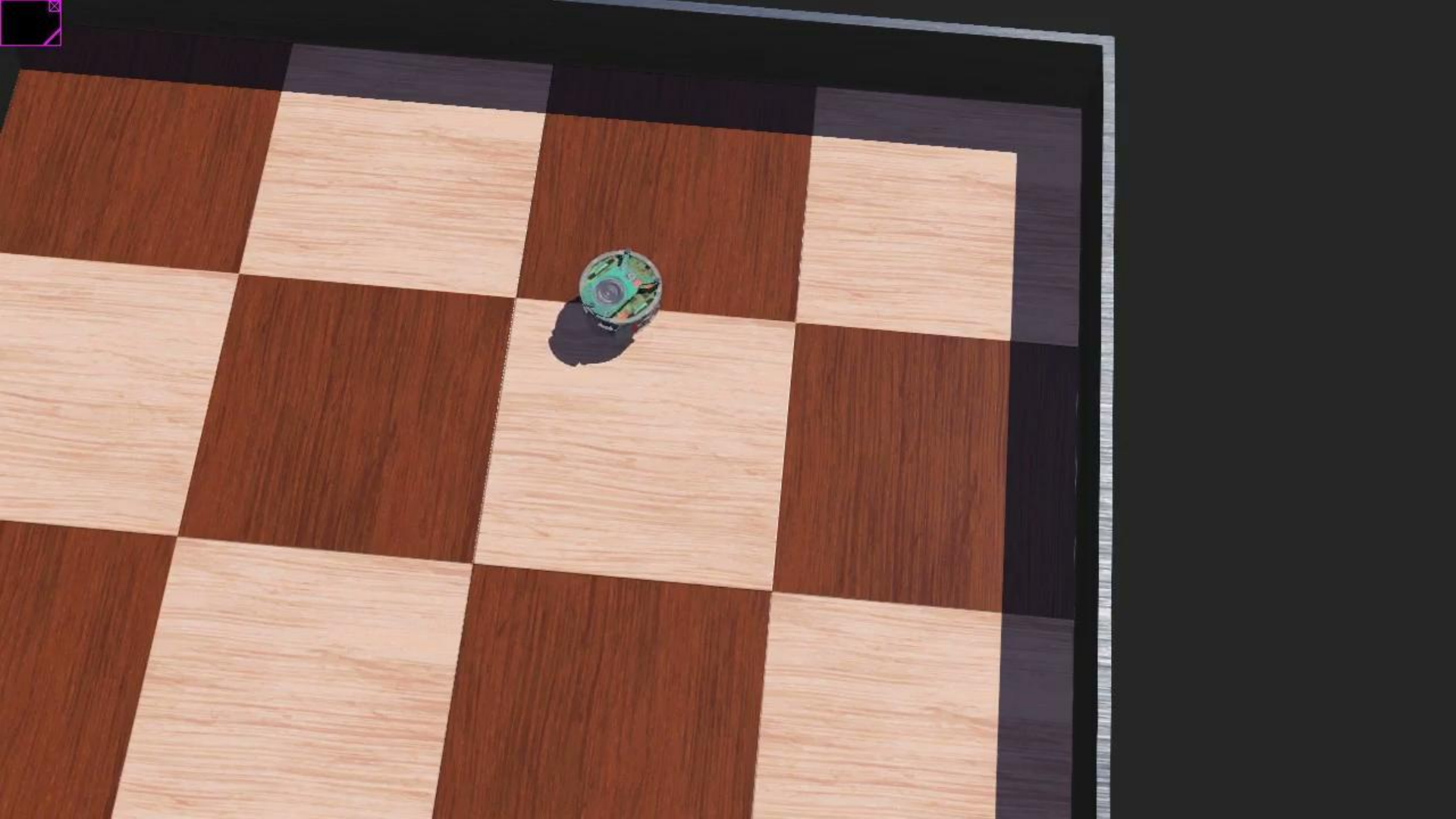
4. Hardware Implementation

5. Testing and Debugging

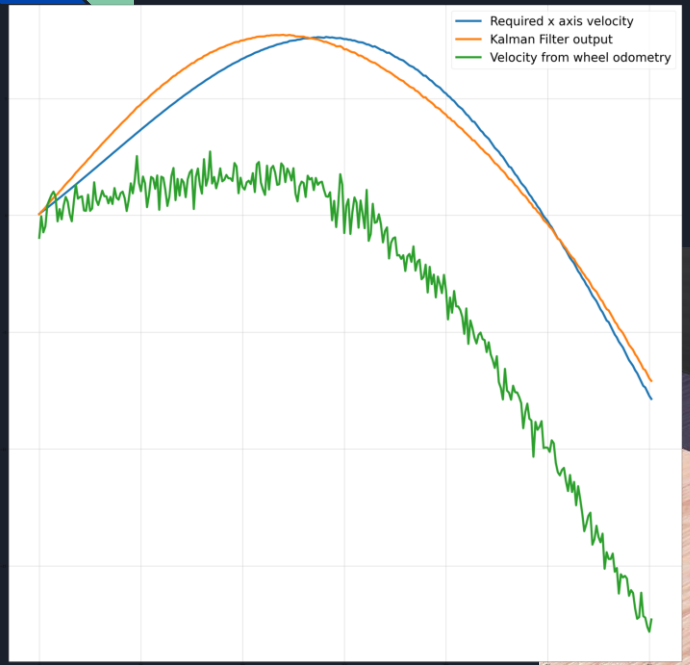
6. Packaging

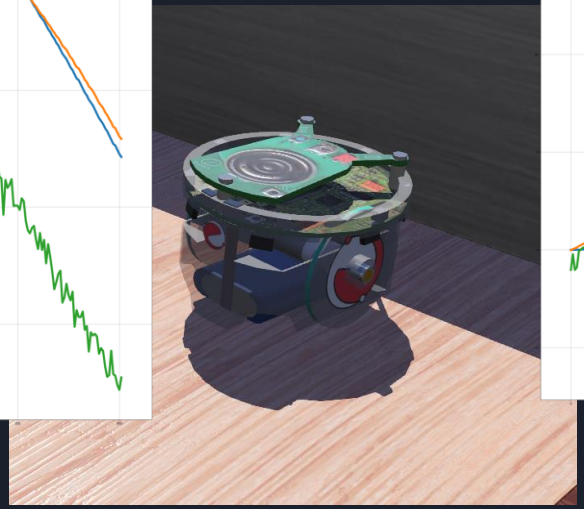


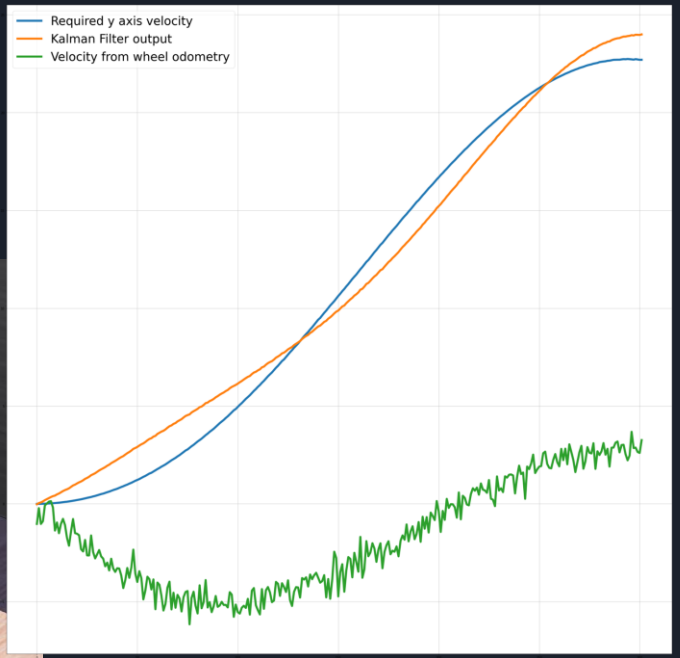




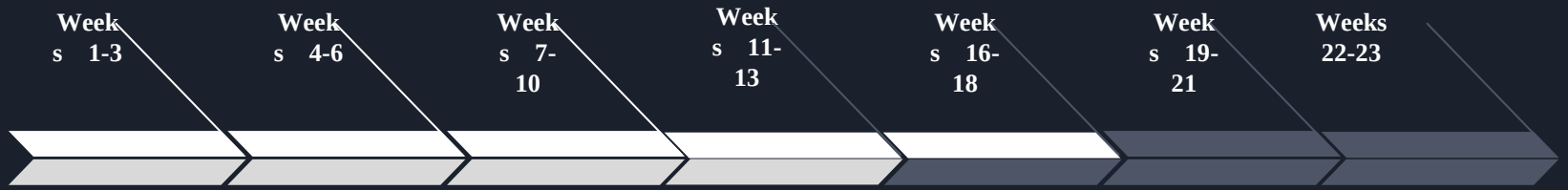
# Results


Required x axis velocity
Kalman Filter output
Velocity from wheel odometry




Required y axis velocity
Kalman Filter output
Velocity from wheel odometry

# Project timeline




Understanding the problem and discussing possible solutions

Designing the block diagram and circuit diagram

Designing of PCB and Robot for demonstration purposes

Coding (kalman,bluetooth module)
.

Separate hardware testing using arduino

Implementation on printed PCB and developing the mobile app
.

Testing and Debugging

# Future Expansions

- Developing an operating system specially devoted for robotic applications
- Real time 3D measurements
- Increasing the capabilities of the processor for video processing

# THANK YOU!

Group Members

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# THANK YOU!