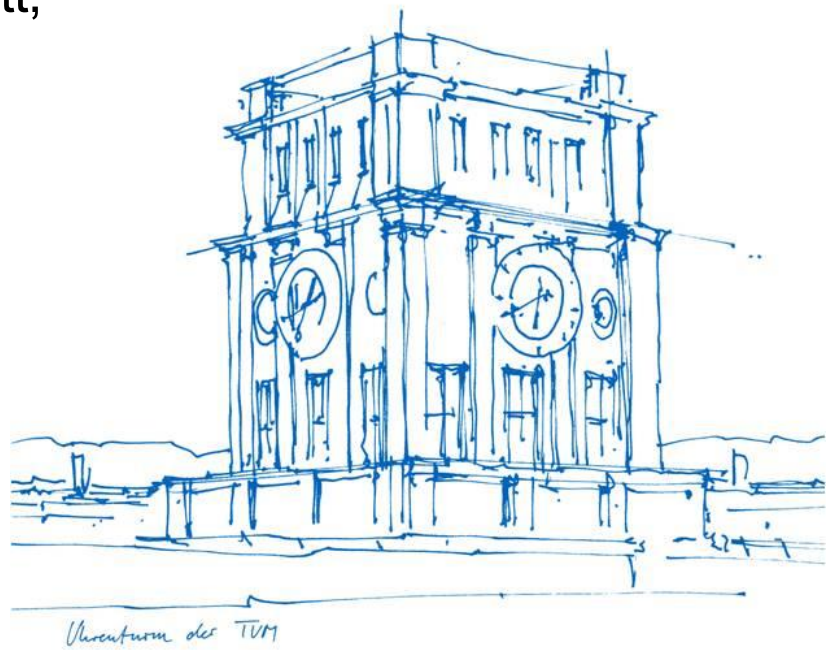
# BOLT – Bluetooth Operated Line Tracker

## Embedded Systems, Cyber-Physical Systems and Robotics

**By Group S:** Zahari Nedev, Shivam Bhatt,
Hejunjie Cao, Shibin Dong,
Ansat Euler ,YunXiang Miao,
Sherniyaz Nurlankul
TUM School CIT



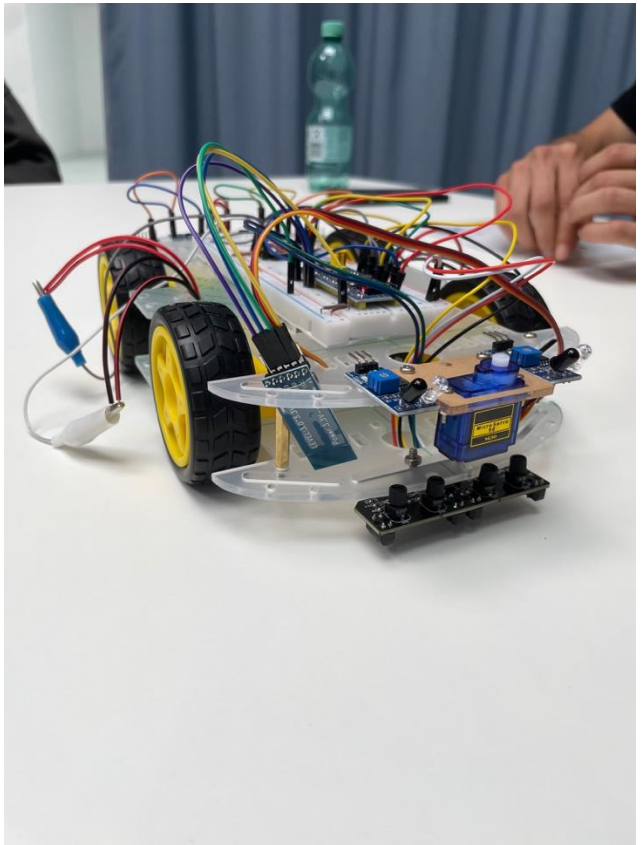
# Overview

- Introduction
- Task distribution
- Video of the project
- Components used
- Bill of materials
- Circuits wiring
- Problems faced
- Future Implementations
- Reflection

# Introduction

Why BOLT?

The future for office delivery robots!



BOLT

# Task Distribution

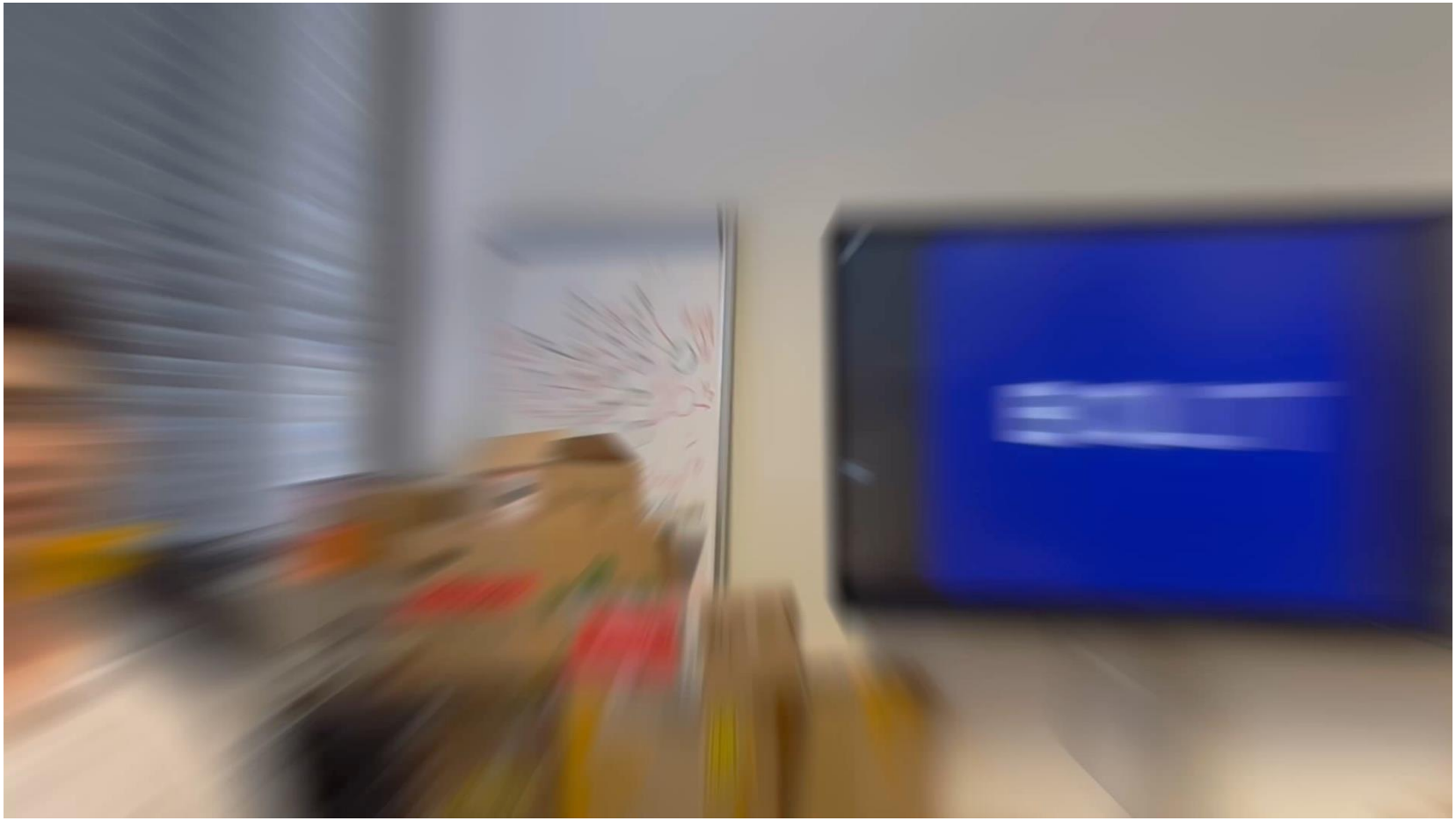
Building the car - YunXiang Miao

Backend - Hejunjie Cao, Shibin Dong

Bluetooth Connection - Ansat Euler, Sherniyaz Nurlankul

Project Managers - Zahari Nedev, Shivam Bhatt

# Video of the project

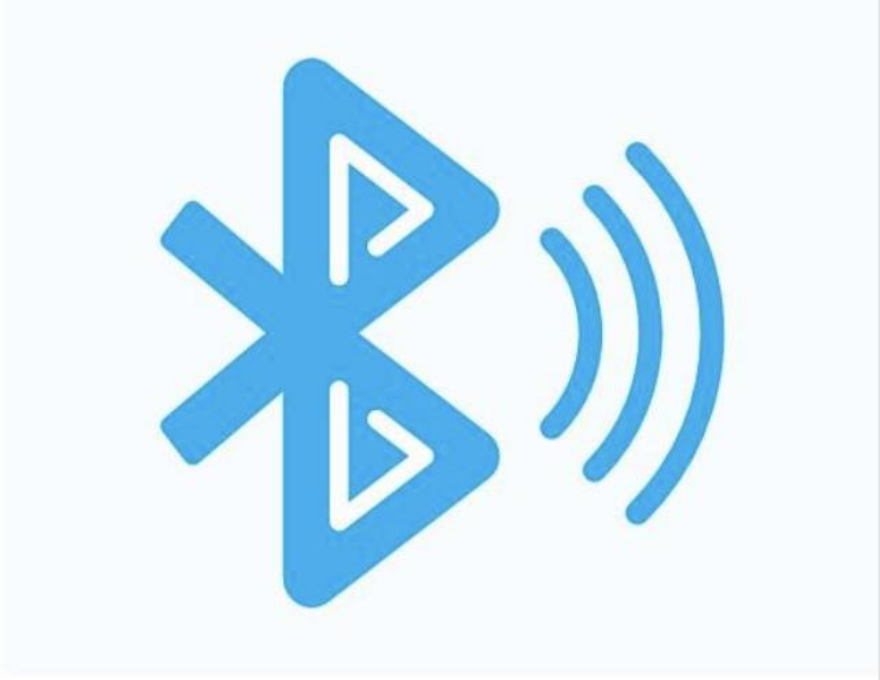


# Components Used

- HC-05 Bluetooth module
- STM32F103C8T6 development board
- HC-SR04 ultrasonic distance sensor
- 0.96-inch OLED display
- TB6612 motor driver module
- ST-Link V2 programmer/debugger for STM32
- YB-MVX01 line tracking sensor module
- Two MH Sensor Series infrared obstacle avoidance sensors
- ASRPro V2.0 voice recognition hardware module

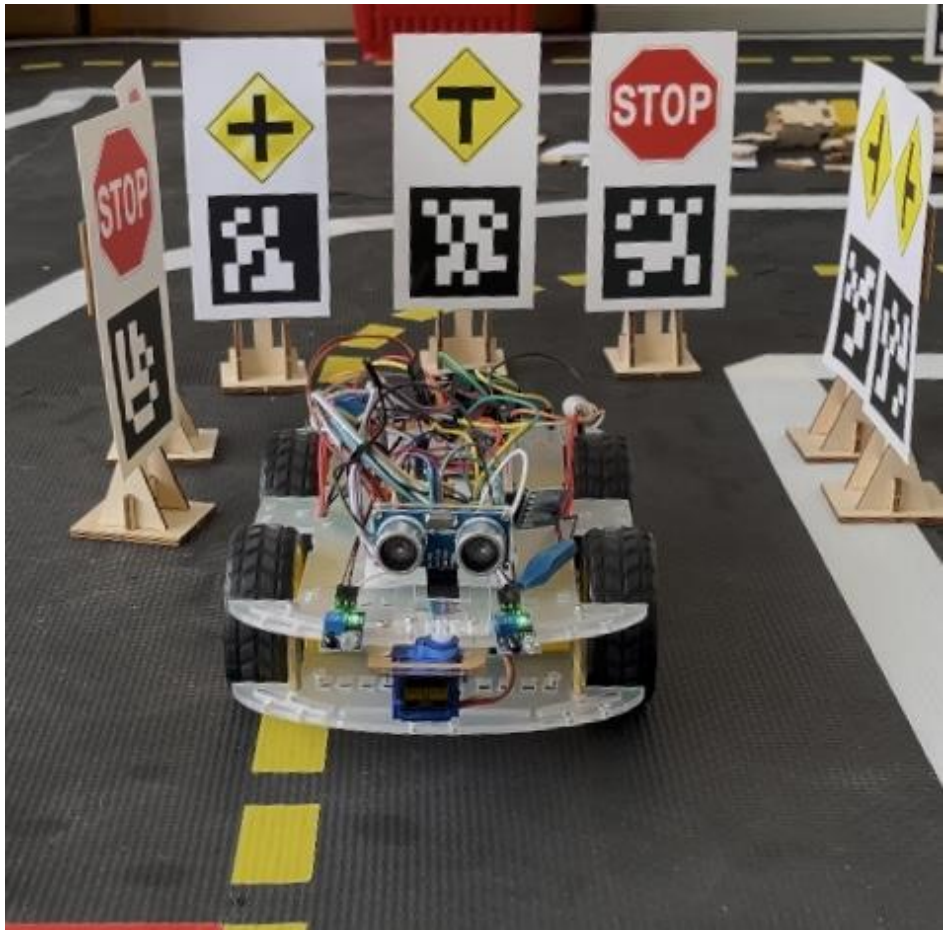
# Bluetooth Module

Why did we choose Bluetooth connection?



# Ultrasonic Distance Sensor

Why do we use this?

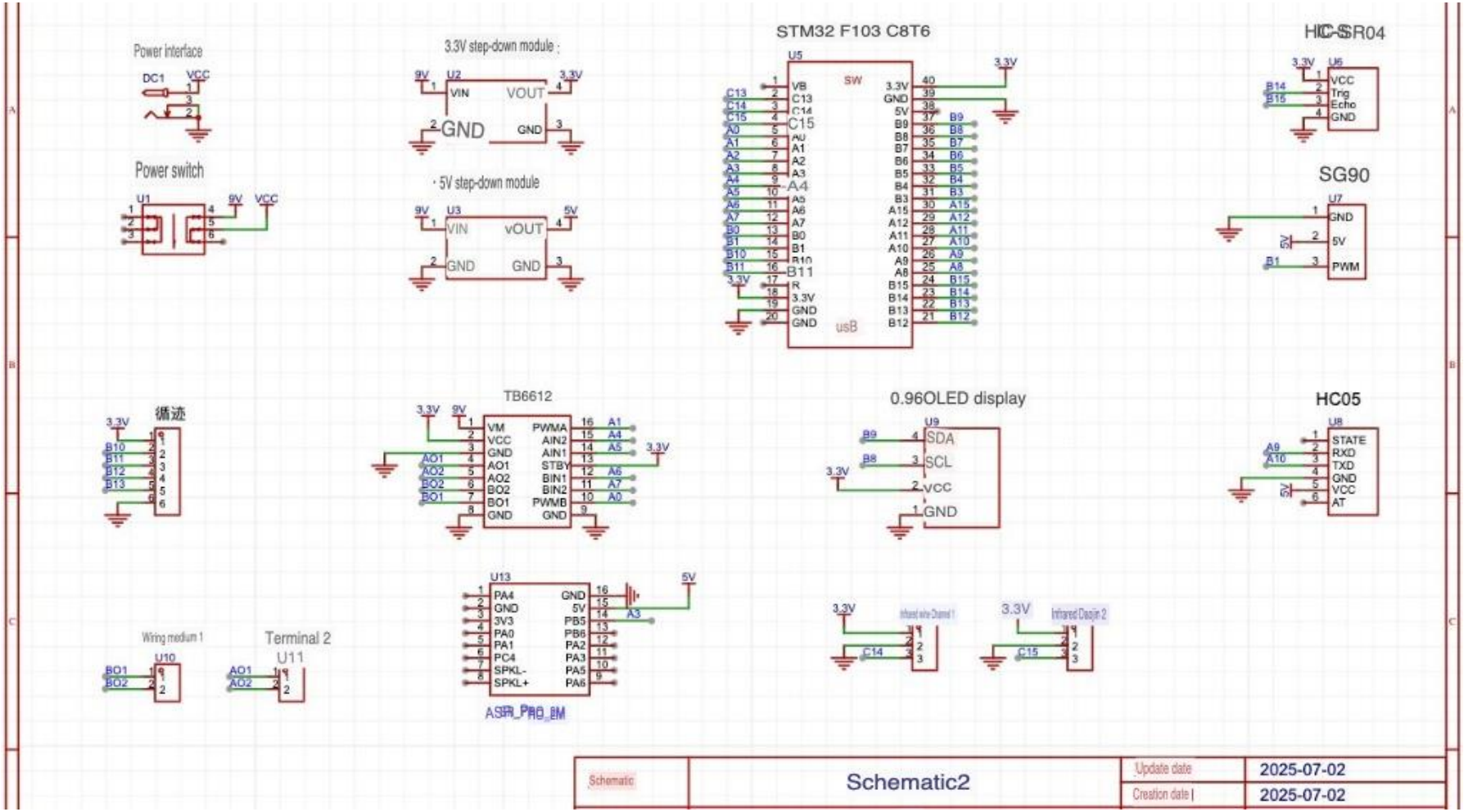


# Bill of Materials

## Bill of Materials (BOM) – Bolt Project

| No. | Component Name | Qty | Description / Purpose |
|---|---|---|---|
| 1 | STM32F103C8T6 Development Board | 1 | Main controller to process sensor inputs and outputs |
| 2 | ST-Link V2 Programmer/Debugger | 1 | For flashing and debugging the STM32 MCU |
| 3 | HC-05 Bluetooth Module | 1 | Wireless communication, e.g., smartphone control |
| 4 | HC-SR04 Ultrasonic Distance Sensor | 1 | Measures distance to obstacles for avoidance |
| 5 | YB-MVX01 Line Tracking Sensor Module | 1 | Detects lines for path following |
| 6 | MH Series Infrared Obstacle Sensors | 2 | Detects nearby obstacles using IR |
| 7 | TB6612 Motor Driver Module | 1 | Drives and controls up to 4 DC motors |
| 8 | 0.96-inch OLED Display | 1 | Displays status or real-time information |
| 9 | 5V Buck Converter | 1 | Regulates power supply to stable 5V |
| 10 | 3.3V Buck Converter | 1 | Provides 3.3V power for modules like Bluetooth |
| 11 | DC Motors | 4 | Used to drive the wheels |
| 12 | Wheels | 4 | Coupled with motors to move the car |
| 13 | Plastic Chassis Plates | 2 | Top and bottom structural plates of the car |
| 14 | Motor Mounting Brackets (Plastic) | 4 | Fix motors to the chassis |
| 15 | Breadboard | 1 | For prototyping and circuit building |
| 16 | Pin Headers | 4 | For soldering and module connections |
| 17 | Jumper Wires (Dupont Wires) | Various | Used for wiring and connecting modules |
| 18 | Screws and Nuts | Various | Used to fasten motors, modules, and frames |
| 19 | Alligator Clip Wires | Various | For temporary electrical connections during testing |
| 20 | SG90 Servo Motor | 1 | Used for rotating sensor modules or steering mechanisms |

# Circuits Wiring



# Problems Faced

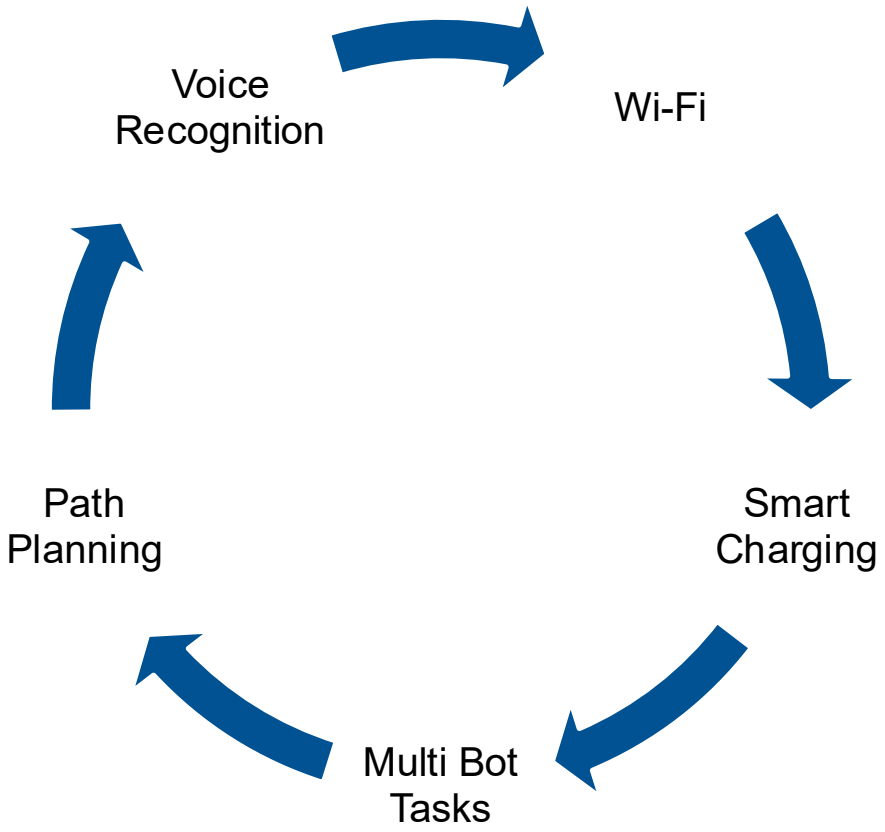
**Hardware Issues** 

- Line tracking confusion due to black surface and line both being black
- Wheels kept disconnecting
- IR Sensor Sensitivity to Light and Shiny Objects

**Software Issues** 

- Making the turns the perfect angles
- Debugging and troubleshooting connectivity issues.
- Delayed Response Between Movements

# Future Implementations



# Reflection


THANK YOU!