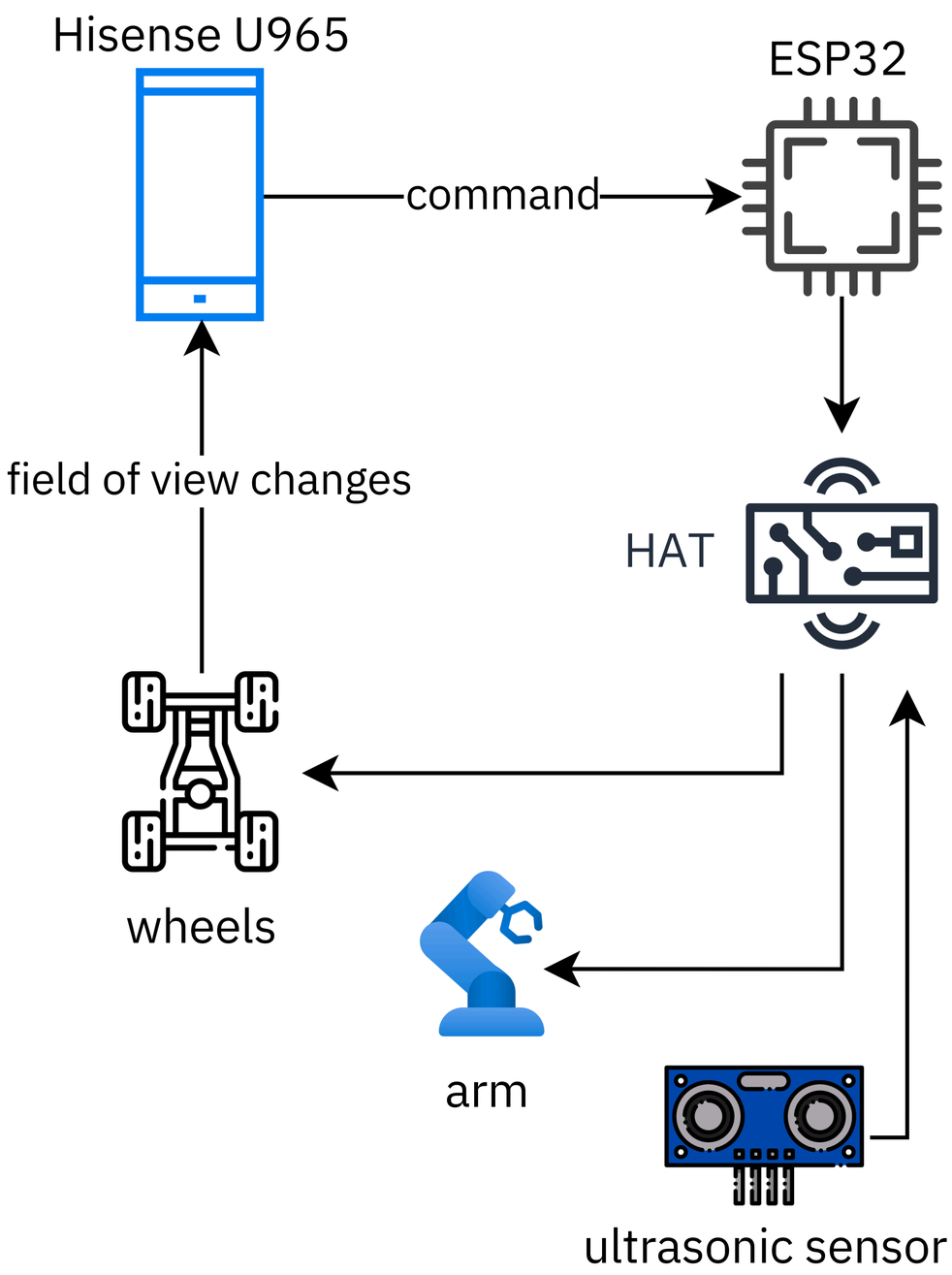
Autonomous Object-Seeking Robot using Smartphone for Vision and Control

Introduction

Old smartphones are being discarded despite being capable for embedded systems.
Aim: Exploring feasibility of repurposing a phone to control a robot using phone's camera and processor.
Task: Robot must find and approach object, then pick it up.

Design

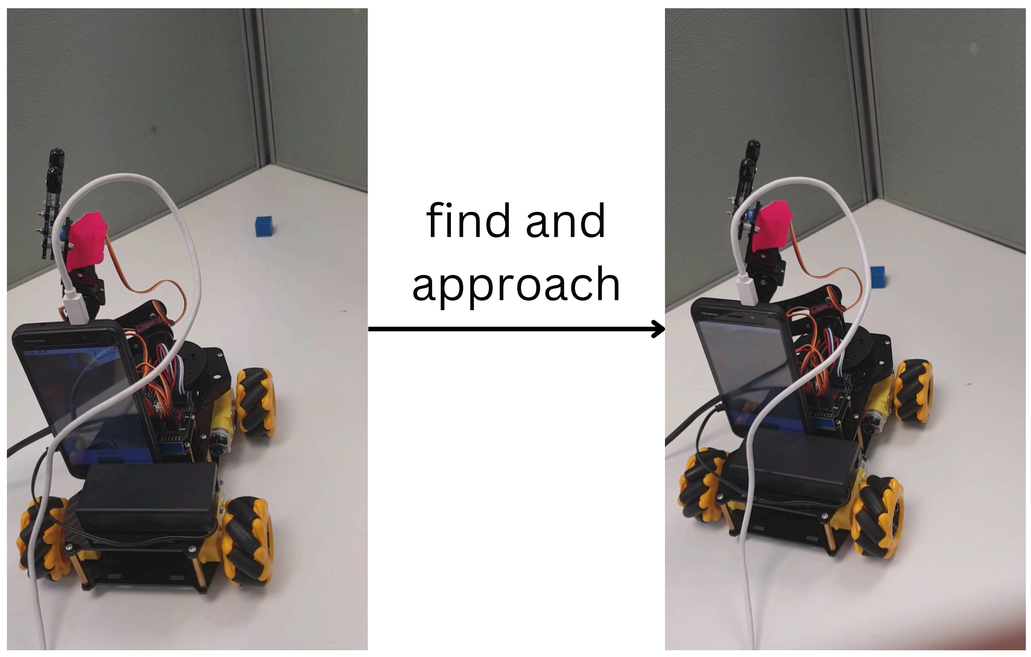


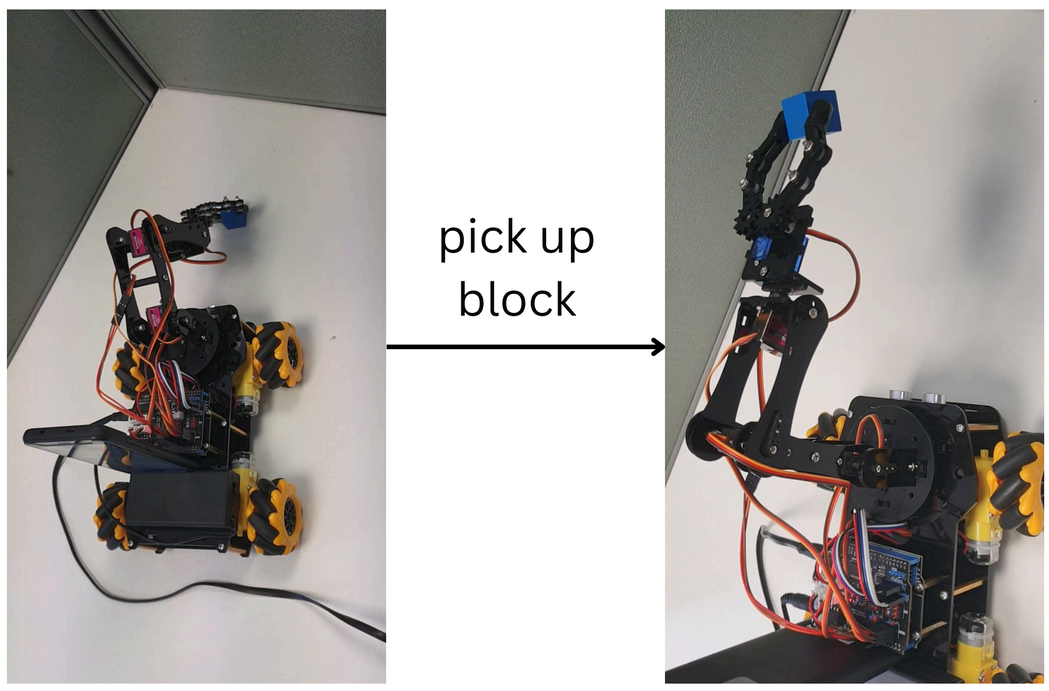
Robot is programmed to find a 2x2x2 cm cube.

Program procedure:

1. Phone is programmed to find block and send commands to ESP32 to move robot towards block.
2. When block is within reaching distance of arm, arm moves to block and picks it up.

Results





Find and Approach and *Pick Up Block* worked successfully, but could not be integrated because arm failed to move to block accurately due to ultrasonic sensor noise.

Conclusions

- Full robot task failed; however, phone integration with robotic system worked, which is demonstrated in *Find and Approach*.
- A low-end Android phone's camera and SoC has been shown to be adequate for vision and control of the robot in tandem with an ESP32 microcontroller.
- **Implications**: With slight modifications to Android app, most Android phones can be interfaced with various embedded platforms.

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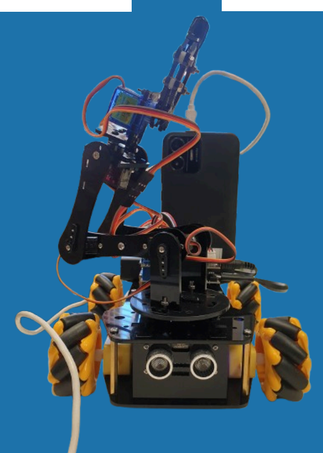

GitHub repository:

- Demo Videos
- Project Report
- Code