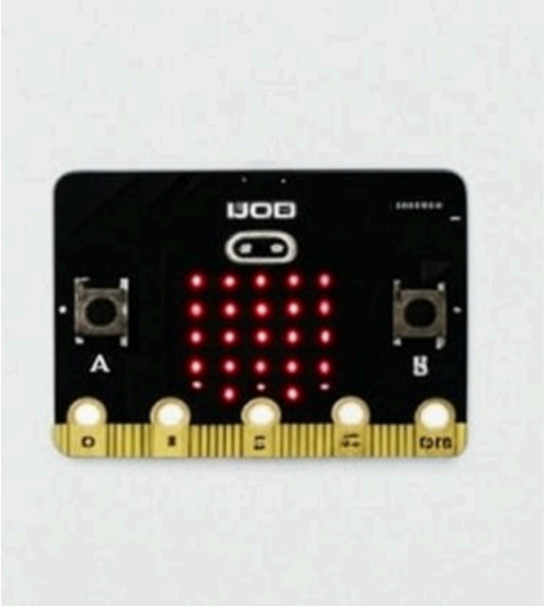
EGC 121 / Computer Architecture

# Compass

## Micro:Bit Project Report



# Team Members: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# Introduction:

This project involved developing a **Digital Compass** using the **BBC Micro:bit V2**. The team implemented the compass logic in Python using the MicroPython environment and uploaded the code to the Microbit via the Micro:Bit Python Editor. Once deployed through a USB connection, the program was executed directly on the Microbit device.

The compass leverages the **Microbit's onboard magnetometer** to determine heading direction in degrees. To enhance interactivity, the project incorporated gesture detection using the **built-in accelerometer**, prompting users to shake the device to initiate calibration. Post-calibration, the compass continuously reads the heading and displays the corresponding **cardinal direction (N, E, S, W) on the 5x5 LED matrix.**

This project provided valuable hands-on experience with embedded systems, sensor calibration, gesture recognition, and real-time data display using the Microbit hardware and MicroPython programming.

# Micro:Bit Functionality:

This project is a **digital compass** built using the BBC Micro:bit V2. When the Microbit is shaken, it begins a calibration sequence using its **onboard magnetometer**. Once calibrated, the compass reads the current heading and displays the corresponding direction on the 5x5 LED display:

- **N** (North): 0°–44° or 315°–359°
- **E** (East): 45°–134°
- **S** (South): 135°–224°
- **W** (West): 225°–314°

It uses the Micro:bit V2's core features:

- **5x5 LED matrix** to show compass directions

- **Accelerometer** to detect the shake gesture and trigger calibration
- **Magnetometer (compass sensor)** to measure heading in degrees
- **Looping logic with delays** to continuously update the display

The compass demonstrates how gesture detection, sensor input, and visual output can be integrated on the Microbit to create a real-time directional navigation tool.

# Video Recording:

A **demonstration** of the working project has been recorded and uploaded to Google Drive. The video showcases the micro:bit detecting **various button presses and gestures**

**Watch here:**

**https://drive.google.com/file/d/13PJoXrYQ3vEFnqC_ez0mqVcEbzZqfWS9/view?usp=drivesdk**

# Conclusion:

The Digital Compass project effectively showcased the versatility of the BBC Micro:bit V2 in building sensor-based applications using MicroPython. By utilizing the built-in magnetometer, accelerometer, and LED matrix, the team developed a functional and interactive compass that responds to real-world orientation. The project provided valuable hands-on experience in sensor calibration, gesture recognition, and real-time data display. Overall, this project highlighted the potential of Microbit for educational and navigational tools, and it opens up possibilities for future enhancements such as graphical heading indicators, integration with GPS modules, or advanced direction-based features.