10. RECOMMENDATIONS AND NEXT STEPS

The autonomous vehicle project has successfully met its core objectives, including reliable lane following, obstacle avoidance, and colour-based decision making. To further enhance the system's robustness, scalability, and practical applicability, the following recommendations and next steps are proposed:

1. **Improve Sensor Fusion:**
   Integrate data from multiple sensors (e.g., IR, ultrasonic, and camera modules) using sensor fusion techniques to enhance accuracy in complex environments.

2. **Add Camera-Based Vision:**
   Introduce a camera module with basic computer vision algorithms (e.g., OpenCV) to recognize traffic signs, lane markings, and dynamic obstacles beyond the capability of IR or color sensors.

3. **Enhance Navigation Algorithms:**
   Implement advanced algorithms such as A* or Dijkstra for path planning, and Kalman Filter for better localization and control under uncertain conditions.

4. **Develop a Scalable Software Architecture:**
   Refactor the current code into modular blocks to support future upgrades, debugging, and potential collaboration with other developers.

5. **Test in Real-World Scenarios:**
   Move beyond lab conditions and test the vehicle on larger, more dynamic tracks with real-world variations in lighting, surfaces, and obstacle types.

6. **Add Remote Monitoring:**
   Incorporate wireless communication (e.g., Bluetooth or Wi-Fi) for remote monitoring, telemetry, and control, allowing real-time feedback and data collection during operation.

7. **Energy Optimization:**
   Analyse battery usage and optimize motor control and sensor usage to extend operating time and improve energy efficiency.