**Part A**

My primary contribution to the Smart Parking System project was the development of the backend server architecture, ensuring real-time communication between the parking database and the mobile application. We successfully developed a working Flutter application for the mobile front end and utilized ASP.NET for backend services, ensuring a robust and scalable system. I designed the database structure to store user registration details and parking spot availability, implementing efficient data retrieval methods to support a seamless user experience. Additionally, I specified the method for integrating GPS technology to accurately pinpoint parking locations, conducted field tests to validate its functionality, and refined the real-time data-fetching process to enhance system responsiveness. Throughout this process, I built upon my previous experience in database management and server-side programming, strengthening my competencies in backend development, real-time data processing, and geolocation integration.

One of the significant challenges I faced was optimizing server performance to handle increasing user requests without lag. I tackled this issue by implementing indexing and caching techniques within the database, reducing query response times. Testing the parking spot detection system using Arduino hardware with motion and infrared sensors required extensive troubleshooting, as environmental factors sometimes interfered with accurate detection. We utilized WiFi, Bluetooth, and USART for communication between the sensors and the backend system. Through persistence and iterative refinements, I ensured that the system could reliably process and update parking spot data in real-time. My successes included the successful integration of GPS with parking data and the implementation of an efficient database structure capable of handling scalability. These efforts reinforced my problem-solving skills and deepened my understanding of data analysis techniques in IoT applications.

**Part B**

As a group, we successfully developed a functional Smart Parking System that integrates real-time parking data, an intuitive Flutter mobile application, and a robust ASP.NET backend infrastructure to assist drivers in locating available parking spots efficiently. Our system is fully operational, with Arduino hardware managing parking spot detection via motion and infrared sensors, and data transmitted using WiFi, Bluetooth, and USART communication protocols. Our collective efforts resulted in a system capable of handling user authentication, secure data storage, and accurate GPS-based parking spot identification. By leveraging sensor technologies, we enabled real-time parking detection and updates, ensuring a reliable user experience. This project allowed me to gain valuable insights into teamwork, particularly the importance of clear communication and well-defined roles in ensuring smooth collaboration.

One of the key successes in our teamwork was our ability to delegate tasks based on individual strengths, which led to efficient project execution. However, a challenge we encountered was aligning our development timelines, especially when dependencies between the backend and frontend needed to be resolved. Some delays arose when integrating the Flutter mobile UI with the ASP.NET backend data, requiring additional coordination between team members. Despite these obstacles, we maintained adaptability and found solutions through regular meetings and troubleshooting sessions. Andrew Pipo deserves special recognition for his dedication to refining the GPS integration and testing data analysis methods, ensuring the system's accuracy and reliability. Overall, our combined efforts resulted in a well-structured and practical solution to urban parking challenges.