IM3080 Design and Innovation Project (AY2023/24 Semester 1)
Individual Report

Name: Xiong Wenxi

Group No: Group 3

Project Title: nIEMtendo

Contributions to the Project

- Project Management: Set up and maintain Jira Board, keep track of the project timeline and milestones.
- Ideation of Computer Vision: Research on using Computer Vision in our project.
- Implementation of Computer Vision (CV):
    - Install the Operation System of Raspberry Pi.
    - Compile the Open-Source Computer Vision libraries.
    - Install dependencies of Python environment.
    - Solve compatibility issues arise from various aspects, such as Operating System, Camera, Python dependencies, etc.
    - Research and design the code to recognize hand landmarks.
    - Implement serial communication between Raspberry pi and Arduino, including Sending message from Raspberry Pi and receiving message at Arduino.
    - Troubleshoot the errors related to CV.
- Arduino Programming:
    - Create game control using joystick.
    - Create game control using CV.
    - Replace delay() function with millis() because delay() function stops the whole program, and millis() function only stops the part of codes which need to be waited for an interval.
- Final Integration of the project:
    - Assist to connect the Raspberry Pi part with the rest of parts.
    - Make modification to the code to ensure orientation aligns with other input types.
- Final Group Report:
    - Add in CV related content into the group report.
    - Add Maintenance Guide into the appendix of the group report.

Reflection on Learning Outcome Attainment

Engineering Knowledge:
Throughout the project, I deepened my understanding of various engineering concepts, particularly in the realms of computer vision, micro-controller, and software development. The hands-on experience in this project significantly expanded my engineering knowledge base.

Problem Analysis:
I developed strong problem analysis skills by addressing compatibility issues arising from different sources, including operating systems, cameras, and Python dependencies. Troubleshooting errors related to computer vision also enhanced my ability to analyze complex problems systematically.

Investigation:
The ideation phase involved thorough investigation, especially during the research on incorporating computer vision into our project. This experience honed my research skills and taught me how to critically evaluate different approaches to find the most suitable solutions.

Design/Development of Solutions:
From designing code for hand landmarks recognition to implementing serial communication between Raspberry Pi and Arduino, I actively participated in the design and development of solutions. This practical application of theoretical knowledge strengthened my ability to create effective solutions.

Modern Tool Usage:
Working on the project exposed me to modern tools and technologies, including Jira for project management, OpenCV for computer vision, and the integration of Raspberry Pi and Arduino. This experience emphasized the importance of staying updated with modern tools in the field.

Individual and Team Work:
My involvement in both individual tasks, such as research and code design, and collaborative efforts, like the integration of different components, showcased the importance of balancing individual responsibilities with effective teamwork. It highlighted the collective strength of a well-coordinated team. This project would not be successful without the efforts of all of my teammates. I realize that fresh perspectives are very helpful when I was working with my teammates.

Communication:
Effective communication played an important role in the success of the project. Clear communication was essential in conveying ideas, discussing problems, and ensuring smooth collaboration.

Project Management and Finance:
Managing the Jira Board, tracking project timelines, and assisting in the final integration showcased my project management skills. It reinforced the understanding of the importance of efficient project management for successful outcomes.