**Risk Register - Sem 1**

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| Project Title: | Robotics for the inspection of confined space | | | Submission Date: | 22/11/24 |
| Group Members: | Madeleine Kane | Alen Joseph | Muhammad Bin Suratman | Muhammad Md  Nazri | George Bowen |
| Supervisors: | Simon Watson | | Paul Wright | | |

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| **Risk Type** | **Risk Description** | **Potential**  **(Low, Medium, High)** | **Severity**  **(Low, Medium, High)** | **Mitigation Measures** |
| Technical Risks | Failure to redesign Inchworm and continuum actuation systems effectively | Medium | High | Perform detailed simulations using CAD and kinematic analysis tools (e.g., MATLAB, SolidWorks). Test prototypes iteratively in real-world mock-up environments. Seek regular feedback from stakeholders and supervisors. |
| Challenges in adapting the continuum unit for turning in the gantry | Medium | High | Perform environmental tests replicating the gantry’s 90-degree corners. Implement adaptive algorithms to optimize movement in constrained conditions. |
| Software data loss or corruption during development | Low | High | Use version control systems like GitHub for regular backups, enabling code recovery in case of accidental loss or corruption. |
| Failure to fully integrate the mechatronics system with sensors and control systems | Medium | High | Break integration into manageable phases. Conduct unit testing for each subsystem, followed by hardware-in-the-loop (HIL) testing. |
| Actuators/motors fail to provide the forces as expected | Medium | High | Perform detailed torque and force testing during the design phase. Incorporate gearing systems or upgrade to higher-spec actuators to amplify force output. |
|  | Sensor inaccuracies in the gantry testing | Medium | High | Implement sensor fusion algorithms to combine data from all sensors. Perform extensive calibration tests in mock-up gantry. |
|  | Unintended damage to gantry surfaces during robot operation | Low | High | Use non-invasive materials (e.g., rubber-coated contact points). Conduct impact tests and include protective measures like soft bumpers to minimize damage risks. |
| Commercial Risks | Failure to meet Amentum and National Highways’ specific needs | High | Low | Maintain regular engagement with stakeholders to align objectives and system functionality. Conduct validation tests in collaboration with Amentum to ensure expectations are met. |
| Budget overruns leading to inability to complete the project or deliver key functionalities | Medium | High | Conduct detailed cost planning with contingency for unforeseen expenses. Regularly update the budget tracker and prioritize critical components over supplementary features. |
| Managerial Risks | Ineffective project management leading to delays | Medium | Medium | Use project management software (Gantt charts) and other methods (Kanban) to track progress. Assign clear responsibilities and deadlines for each task. |
| Team communication issues leading to misaligned objectives | Medium | Medium | Hold regular team meetings and establish clear communication channels like Microsoft Teams and Whatsapp channel. |
| Resource shortages (materials, testing facilities) | Medium | Medium | Secure access to critical resources early in the project.  Establish backup options for materials. |
| Teammate experienced a serious injury | Low | High | Assign a buddy system to ensure workload coverage. Maintain documentation for team roles to facilitate redistribution of tasks during unforeseen absences. |
| Procurement risk Includes order and manufacturing delays, and logistical disruptions. | Medium | High | Plan orders and manufacturing early, and ensure timely delivery and cost stability. |