**282.762 – Robotics and Automation – Assignment 3**

**Aim:**

To develop an application that can calculate spatial transformations given a workspace with objects that need to be translated and rotated to a desired location.

**Objectives:**

* To find the work piece and its target location in a given workspace.
* To calculate the distance and angle required to translate and rotate the work piece from its current location to it target location.
* To express the distance and angle as a homogeneous transform.

**Description:**

You are required to write a program that can calculate the spatial transformation necessary to translate and rotate a work piece from its current location to it target location. The program’s input will be a picture of a workspace. The program’s output will be a homogenous transform.

**Constraints:**

* You must use the sample images provided.

**Resources:**

* You will be provided with sample images.

**Method of Assessment:**

* You will be required to submit your program for testing.
* You will be required to submit a report about you program.

A grade out of 20 marks will be given for correct transformations; where, each transformation will be given a grade out of four marks.

A grade out of 30 marks will be given for the report.

Assignment 3 will be out of a total grade of 50 marks.

**Additional Information:**

Assignment 3 assesses the following learning outcomes:

1. Use artificial vision and optimization methods in artificial vision.

Assignment 3 accounts for 30% of the 282.772 paper’s grade.

Assignment 3 is an individual project.

**Spatial transformation Marking Rubric:**

The following rubric provides an overview of how marks will be allocated for each spatial transformation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Demonstration** |  |  |  | **4 Marks** |
| 0 | 1 | 2 | 3 | 4 |
| No spatial transformation given. | No spatial transformation given. | No spatial transformation given. | Incorrect spatial transformation given. | Correct spatial transform given. |
| Distance and angle required to translate and rotate work piece, respectively, are incorrect. | Distance or angle required to translate and rotate work piece, respectively, is correct. | Distance and angle required to translate and rotate work piece, respectively, are correct. | Distance and angle required to translate and rotate work piece, respectively, are correct.  Spatial transformation is improperly formed. | Distance and angle required to translate and rotate work piece, respectively, are correct.  Spatial transformation is properly formed.  Correct solution. |
| No effort applied. | Minimal effort applied. | Below average effort applied. | Average effort applied. | Above average effort applied. |

**Report Marking Rubric:**

The following rubric provides an overview of how marks will be allocated for the report.

|  |  |  |  |
| --- | --- | --- | --- |
| **Introduction/Aim/Objective** |  |  | **5 Marks** |
| 0 | 1 - 2 | 3 - 4 | 4 - 5 |
| No introduction, aim, or objective provided. | Simple introduction, aim, and objective provided. | Average introduction, aim, and objective provided. | Above average introduction, aim, and objective provided. |
|  | E.g. Copy of project brief’s introduction, aim, and objective. | E.g. Copy of project brief’s introduction, aim, and objective.  Some personal aims, objectives. | E.g. Reference to project brief’s introduction, aim, and objective. Personalised introduction, aim, and objective. Clear overview of project. |
| No effort applied. | Minimal effort applied. | Average effort applied. | Above average effort applied. |

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| --- | --- | --- | --- |
| **Methodology/Solution** |  |  | **15 Marks** |
| 0 | 1 - 5 | 6 - 10 | 11 - 15 |
| No Methodology provided. | Simple methodology provided. | Average methodology provided. | Above average methodology provided. |
|  | E.g. Simple description of what was done. | E.g. Moderate description of what was done and how. | E.g. Detailed description of what was done, how, and why. |
| No effort applied. | Minimal effort applied. | Average effort applied. | Above average effort applied. |

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| --- | --- | --- | --- |
| **Results/Discussion/Conclusion** |  |  | **5 Marks** |
| 0 | 1 - 2 | 3 - 4 | 4 - 5 |
| No results, discussion, and conclusion provided. | Simple results, discussion, and conclusion provided. | Average results, discussion, and conclusion provided. | Above average results, discussion, and conclusion provided. |
|  | E.g. Simple description of project outcome, minimal discussion, and simple conclusion provided. | E.g. Moderate description of project outcome, some discussion, and average conclusion provided. Some critical evaluation of processes and methodology provided. | E.g. Detailed description of project outcome, detailed discussion and above average conclusion provided. Detailed critical evaluation of processes and methodology provided. |
| No effort applied. | Minimal effort applied. | Average effort applied. | Above average effort applied. |

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| --- | --- | --- | --- |
| **Presentation/Structure** |  |  | **5 Marks** |
| 0 | 1 - 2 | 3 - 4 | 4 - 5 |
| No presentation. | Simple presentation and structure. | Average presentation and structure. | Above average presentation and structure. |
|  | E.g. Report consists of a “wall of text”. No figures. No tables. No clear structure. | E.g. Report has some structure. Includes some figures. Includes some tables. | E.g. Report has appropriate balance between text, figures, and tables. Excellent structure; includes table of contents, list of figures, sections, and captions. |
| No effort applied. | Minimal effort applied. | Average effort applied. | Above average effort applied. |