REVIEWER'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Gaze Control and Stabilization for a Humanoid Robot Using Neck Joints**
Author's name:	**Zuzana Jindrová**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Alessandro Roncone, PhD
Reviewer's department:	Computer Science Department, College of Engineering and Applied Sciences, University of Colorado Boulder, Boulder, CO, U.S.A.

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment — **challenging**

Evaluation of thesis difficulty of assignment.

The assignment is challenging as it involves developing a complex neck controller for a humanoid robot to control gaze and stabilize it using neck joints only, which is a sophisticated task requiring a deep understanding of robotics, kinematics, and control theory. I consider this an advanced project for a Bachelor-level thesis.

Satisfaction of assignment — **fulfilled**

Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.

The thesis meets the assignment comprehensively. The student successfully developed and implemented a neck controller for the iCub robot, utilized algebraic inverse kinematics, and evaluated the system's performance in both simulations and real scenarios. The results and evaluations were thorough and complete, addressing all aspects of the assignment in detail. There were no significant shortcomings.

Method of conception — **correct**

Assess that student has chosen correct approach or solution methods.

The student chose appropriate methods, using algebraic solutions over numerical ones for efficiency. The decision to utilize the redundancy in the neck plant for secondary tasks was well-executed and in line with the state of the art in the field.

Technical level — **A - excellent.**

Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.

The technical level demonstrates a thorough understanding of robotics and control systems. The student effectively used knowledge from relevant literature to develop a robust solution.

Formal and language level, scope of thesis — **A - excellent.**

Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.

The formal notation and typographical arrangement were correct. The language was clear and understandable, demonstrating a good command of technical terminology and academic writing. I did not see any major issues due to the translation of this text from Czech to English.

Selection of sources, citation correctness — **A - excellent.**

Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.

The student demonstrated diligence in selecting and using relevant sources, including recent and seminal works in the field that can be considered "state of the art". Citations were correctly formatted and appropriately distinguished between the student's contributions and existing work.

Additional commentary and evaluation *Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.*
The thesis demonstrates a high level of theoretical and practical achievement. The implementation on the iCub robot and the evaluation through various experiments are particularly commendable.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation. Please present apt questions which student should answer during defense.

This thesis represents a solid piece of work that combines both theoretical and practical elements effectively. The approach to using the neck plant's redundancy for secondary tasks is well-executed. The performance evaluation is thorough and demonstrates a clear understanding of the subject matter. I would like to commend the student and say that her dedication to the project really shows! Great job.

Questions for the defense:

1. Can you elaborate on the challenges faced during the implementation phase and how you overcame them?
2. How would your approach handle dynamic and unpredictable movements in real-world scenarios?
3. What are the potential limitations of your gaze control system, and how might they be addressed in future work?

I evaluate handed thesis with classification grade **A - excellent.**

Date: **31.5.2024** Signature: