Budapest University of Technology and Economics

Faculty of Mechanical Engineering

Department of Fluid Mechanics

http://www.ara.bme.hu/

FINAL PROJECT ASSIGNMENT

Publicly Available

Identification

Name: **Hajdú Bence**		ID: **76601928063**	
Code of the Curriculum: 2N-MW0		Specialisation:	Document ref. number:
Curriculum: Master Program in Mechanical Engineering Modelling		2N-MW0-FM	GEÁT:2021-T:2N-MW0:DS5M1P
Final Project issued by: Department of Fluid Mechanics		Final exam organised by: Department of Fluid Mechanics	
Supervisor: Joshua Patrick Davidson (71569852589), research fellow			

Project Description

Title

Automated CFD mesh generation using machine learning

CFD hálógenerálás automatizálása gépi tanulás segítségével

Details

Traditional mesh generation and verification, involves manually creating a mesh, performing convergence studies on the discretisation level and validation against experimental data. This project will investigate an inverse approach, where the experimental data will be used to train a machine learning algorithm to produce a high quality mesh, able to reproduce the experimental data, whilst minimising the total overall cell count. The project will focus on the open source CFD software, OpenFOAM.

To achieve this goal, the following specific tasks must be implemented.

1. Literature survey – surveying and analysing relevant resources of technical literature

2. OpenFOAM mesh generation – investigate the meshing procedures and algorithms in OpenFOAM and identify how they can be automated

3. Machine learning algorithms – Identify the most appropriate machine learning algorithms to implemented

4. Case studies – Demonstrate the proposed automated mesh generation

5. Reporting - Summarise the work in the required document format of the MSc Thesis

Advisor

Advisor's Affiliation:

Skellig AI Technologies Limited

0 Strandhill, Co. Sligo, Ireland, Strandhill Enterprise Centre Block E.

Advisor: Dr. Iain Keaney, expert

Final Exam

1st subject (group)	2nd subject (group)	3rd subject (group)	4th subject (group)
ZVEGEÁTNW02 Computational Fluid Dynamics	**ZVEGEÁTNW03** Fluid Mechanics Measurements	**ZVEGEÁTNW11** Open Source Computational Fluid Dynamics	**ZVEGEVGNX27** Áramlások stabilitása

Authentication

Handed out: 8 February 2021		Deadline: 14 May 2021	
Compiled by: Joshua Patrick Davidson (71569852589) Supervisor		Verified by: *Dr. János Vad* (signed) Head of Department	Approved by: *Dr. Péter Bihari* (signed) Vice-Dean

The undersigned declares that all prerequisites of the Final Project have been fully accomplished. Otherwise, the present assignment for the Final Project is to be considered invalid.

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Hajdú Bence