Budapest University of Technology and Economics

Faculty of Mechanical Engineering

Department of Fluid Mechanics

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

F I N A L   P R O J E C T   A S S I G N M E N T

CLASSIFIED

<table>
<tr><td rowspan="6">Identification</td><td colspan="2">Name: Ahmadli Kamran</td><td colspan="2">ID: 73482400836</td></tr>
<tr><td colspan="2">Code of the Curriculum: 2NAMW0</td><td>Specialisation:</td><td>Document ref. number:</td></tr>
<tr><td colspan="2">Curriculum: Master Program in Mechanical Engineering Modelling</td><td>2NAMW0-SM</td><td>GEÁT:2021-T:2NAMW0:FNX6C0</td></tr>
<tr><td colspan="2">Final Project issued by:</td><td colspan="2">Final exam organised by:</td></tr>
<tr><td colspan="2">Department of Fluid Mechanics</td><td colspan="2">Department of Applied Mechanics</td></tr>
<tr><td colspan="4">Supervisor: Joshua Patrick Davidson (71569852589), research fellow</td></tr>
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<table>
<tr><td rowspan="3">Project Description</td><td>Title</td><td>Development of Energy Harvesting Technology for Pump Condition Monitoring Wireless Sensors
Energiahasznosítási technológia fejlesztése a szivattyú állapotfigyelő vezeték nélküli érzékelőkhöz</td></tr>
<tr><td>Details</td><td>Data collected from industrial equipment is very important for monitoring both performance and health condition of an asset. The gathered data can be post-processed by an advanced analytic method to more accurately identify or even predict the outcomes and thus to help operators make a more informed decision. This generally requires a greater number of sensors or a higher sampling rate, both of which results in an increased amount of power consumption. This can have a significant effect on battery life of wireless sensors, which customers prefer for retrofit installations.
Various ambient energy sources are readily available in the pump system and surrounding. Examples include, but not limited to, vibration, pressure fluctuation, temperature gradient, sunlight, and rotating body. This waste energy can be scavenged through many available techniques using piezoelectrics, thermoelectrics, photovoltaic cells, magnets, etc. The harvested energy can be used to charge batteries so that the wireless sensors can operate for a longer duration or even semi-indefinitely.
A thesis can be either computational or experimental, or both. Target deliverable can include the following:
1. One or more proposed designs for pump applications
2. Analytic calculation for maximum energy or power (density) of proposed EH system.
3. Comparison of different energy harvesting technologies based on criteria (which also needs to be developed), if applicable.
4. Computational results (e.g. FEA)
5. A prototype development and testing.</td></tr>
<tr><td>Advisor</td><td>Advisor's Affiliation:
    FLOWSERVE Corporation
    92590 Temecula, CA (USA), Tierra Alta Way # C 27455.
Advisor: Dr. Hwan Ryul Jo, simulation engineer</td></tr>
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<tr><td rowspan="3">Final Exam</td><td>1st subject (group)</td><td>2nd subject (group)</td><td>3rd subject (group)</td><td>4th subject (group)</td></tr>
<tr><td>ZVEGEÁTNW02
Computational Fluid Dynamics</td><td>ZVEGEÁTNW03
Fluid Mechanics Measurements</td><td>ZVEGEMMNWCM
Continuum Mechanics</td><td>ZVEGEMMNWFE
Finite Element Analysis</td></tr>
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<tr><td rowspan="4">Authentication</td><td colspan="2">Handed out: 8 February 2021</td><td colspan="2">Deadline: 14 May 2021</td></tr>
<tr><td colspan="2">Compiled by:</td><td>Verified by:</td><td>Approved by:</td></tr>
<tr><td colspan="2">Joshua Patrick Davidson (71569852589)
Supervisor</td><td>Dr. János Vad (signed)
Head of Department</td><td>Dr. Péter Bihari (signed)
Vice-Dean</td></tr>
<tr><td colspan="2">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.

……………………………………..
Ahmadli Kamran</td><td colspan="2"></td></tr>
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