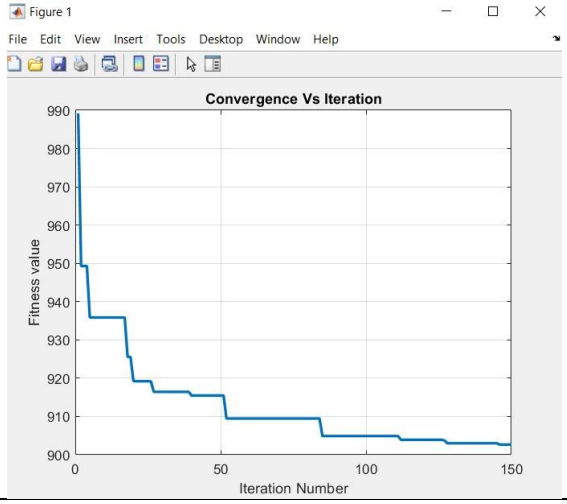
Department of Mechanical Engineering
Final Year Project 2020/2021
Research Activity Log

Name	Yousef Hosny Elsayed
Matric No.	17102162/1 – KIG160717
Supervisor	Dr Sabariah
Project Title	Optimization of Plate Fin Heat Exchanger using Grey wolf optimization, Genetic Algorithm and Particle swarm optimization algorithms

Date	**Activity**
	WEEK 1
10/3/2021	Researching and reading papers related to my topic to identify a research gap and tackle it in this semester, found out that the Plate Fin Heat Exchanger was never optimized using Grey Wolf Optimization Algorithm and successfully identified the novelty of my project which is the implementation of Grey Wolf Optimization algorithm to my design problem
	WEEK 2
17/3/2021	Read books and articles and watching lectures and videos that explain the working mechanism and the implementation of the Grey wolf optimization algorithm to be able to understand the algorithm and develop the code using MATLAB
	WEEK 3
24/3/2021	Literature reviewed real world applications where Grey wolf optimization algorithm was implemented and reviewing the feedbacks of researches that used Grey wolf optimization algorithm in their optimization problem
	WEEK 4
30/3/2021	Meeting with my supervisor (Dr Sabariah) where I presented to her the research gap that I found and my intention in implementing the Grey wolf optimization algorithm to my design optimization problem, and I got a feedback from here on the challenges that I might face during the implementation of the algorithm since it was considered a discrete algorithm

<table>
<tr><td></td><td>WEEK 5</td></tr>
<tr><td>7/4/2021</td><td>Developing the Grey wolf optimization algorithm MATLAB code on a simple problem to test it and ensure that it is working perfectly and all constraint conditions are satisfied</td></tr>
<tr><td>11/4/2021</td><td>Implemented the Grey wolf optimization algorithm MATLAB code on my design optimization problem and shared the convergence graph and results I have obtained with my Supervisor for feedback.
 
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<tr><td colspan="2">WEEK 6</td></tr>
<tr><td>14/4/2021</td><td>Developed the Particle Swarm optimization algorithm MATLAB code on a simple problem to test it and ensure that is working perfectly and all constraint conditions are satisfied</td></tr>
<tr><td colspan="2">WEEK 7</td></tr>
<tr><td>21/4/2021</td><td>Finalized the Particle swarm optimization code and implemented it on my design problem, obtained preliminary results.</td></tr>
<tr><td>22/4/2021</td><td>Debugged the Particle Swarm optimization code after noticing a flaw in the constraint conditions, reformulated the constraint conditions and objective function and analyzed the newly obtained results and confirmed that the algorithm is working as required.</td></tr>
<tr><td colspan="2">WEEK 8</td></tr>
<tr><td>30/4/2021</td><td>Debugged the Grey Wolf optimization algorithm and Genetic Algorithm code and fixed an error that was found in the constraint conditions</td></tr>
<tr><td></td><td>WEEK 9</td></tr>
<tr><td>6/5/2021</td><td>The system was modified, after reviewing the paper of Yousefi (2011), I found that there was a constraint that he implemented which is the heat duty constraint, thus for a fair comparison between the results obtained in this project and the results obtained by Yousefi (2011) the heat duty constraint was added to all 3 algorithms (GWO, PSO and GA) in this project.</td></tr>
<tr><td colspan="2">WEEK 10</td></tr>
<tr><td>20/5/2021</td><td>Finalized the Grey Wolf optimization algorithm, Genetic Algorithm and Particle swarm optimization algorithms and created a script for each algorithm that would run the algorithm for 10 times at different population sizes and save the results in an excel sheet and the convergence graphs in a folder, a test of the script was ran and a sample of the results were shared with my supervisor.
<table>
<tr><th>SOLUTION</th><th>Parameter 1</th><th>Parameter 2</th><th>Parameter 3</th><th>Parameter 4</th><th>Parameter 5</th><th>Parameter 6</th><th>Parameter 7</th></tr>
<tr><td>940.895</td><td>1</td><td>1</td><td>0.01</td><td>0.0002</td><td>196.9374804</td><td>0.008710144</td><td>71.04511998</td></tr>
<tr><td>940.942</td><td>1</td><td>1</td><td>0.01</td><td>0.0002</td><td>197.0213239</td><td>0.008872136</td><td>71.43043395</td></tr>
<tr><td>940.902</td><td>1</td><td>1</td><td>0.01</td><td>0.0002</td><td>196.986543</td><td>0.008443843</td><td>70.17494395</td></tr>
<tr><td>941.064</td><td>1</td><td>1</td><td>0.01</td><td>0.0002</td><td>197.0207531</td><td>0.009053942</td><td>71.96230015</td></tr>
<tr><td>941.014</td><td>1</td><td>1</td><td>0.009996832</td><td>0.0002</td><td>197.0402089</td><td>0.008925143</td><td>71.58476962</td></tr>
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<tr><td colspan="2">WEEK 11</td></tr>
<tr><td>26/5/2021</td><td>Analyzed the final results obtained and their corresponding convergence graphs and successfully identified the optimal algorithm properties (Population size and Maximum iteration number) of each algorithm at which optimal results are obtained</td></tr>
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WEEK 12	
2/6/2021	Adding all the results obtained to the FYP Report and writing the discussion and conclusion of my findings
WEEK 13	
9/6/2021	Submitted a draft of my FYP report to my supervisor for feedback.
10/6/2021	Modifications were done on the FYP report
WEEK 14	
18/6/2021	Report submission

Prepared by:

Name: Yousef Hosny Elsayed

Verified by:

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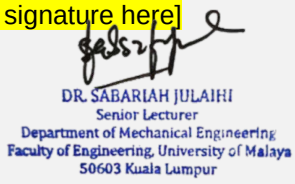

Supervisor's Name: Dr Sabariah