

62nd State Science & Engineering Fair of Florida

OFFICIAL ABSTRACT AND CERTIFICATION



62nd State Science and Engineering Fair of Florida
March 28 – 30, 2017 The Lakeland Center, Lakeland

Project Title Meta-Heuristic Algorithm using Ant Colony Optimization
(must match Display & Entry Title)

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School, City, State Strawberry Crest High School, Dover, Florida

As the systems around us get more complex, many shortcomings of a centralized optimization can be seen vividly. To solve this, we must come up with decentralized, individually smart, and collectively intelligent systems. To achieve this, I have created a meta-heuristic algorithm that is successfully tested against Sphere's Test Optimization Function. I have named it as "EEE ACO Meta-Heuristics Algorithm." In my algorithm, I used ants that must reach the destination. I tested how many moves it takes for an ant to reach the destination and how many ants should explore instead of follow. In this algorithm, the ants use each other to reach the destination. Initially they make three random moves. Afterwards, a set amount of ants explore (make another random move), and the other set follows the ant with the most pheromone. Pheromone is given to an ant when it makes a move approaching the destination, is being followed, and taken away when it makes a move going away from the destination. According to my data, it took 10 ants around 55 moves to reach the destination when 25% of them explored and only 25-43 moves when 45% of them explored. This shows that when around 45% are exploring the best convergence is achieved. If too many ants are exploring there is less exploitation, and if too less are exploring, the ants could possibly not be using the fastest paths possible. This shows how my meta-heuristic algorithm is optimized and could be applied to real world challenges.

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- As a part of this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):
 - ☐ human subjects
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 - ☐ vertebrate animals
 - ☐ microorganisms
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- This abstract describes only procedures performed by me/us, reflects my/our own independent research, and one year's work only.
 - ☒ Yes
 - ☐ No
- I/we worked or used equipment in a regulated research institution or industrial setting. ☐ Yes ☒ No **Form 1C required**
- This project is a continuation of previous research. ☐ Yes ☒ No **Form 7 required**
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I/We hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I/We also attest that the above properly reflects my/our own work.

Finalist or Team Leader Signature

January 14, 2017

Date

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