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|  | **HASAN KALYONCU UNIVERSITY**  **Computer Engineering Department** **COME 499 Project Proposal Form** |

**Part I. Project Proposer**

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**Part II. Project Information**

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| **Starting Term** | |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 2 | 0 | 1 | 9 | / | 2 | 0 | 2 | 0 | |
| **Title of the Project** | Optimization of PID controller parameters using Artificial Bee Colony Algorithm (ABC) |
| **Project Description** | |
| Closed-loop control systems are used for the controlling of many systems nowadays. These systems basically consist of a sensor that measures variables as the controller, the system to be controlled and variables to be controlled. Thus, the disruptive effect on the system output of external effects or internal dynamics is minimized and the system output is being provided to be reached the desired value in the appropriate time for the application.  One of the most widely used control algorithms is PID (Proportional-Integral-Derivative). PID controllers are popular in the industry. The characteristic of the PID controller is effected the controller coefficients and optimum parameters must be tuned for good control. The proper monitoring of the system with the PID controller is possible by correctly determining the specific parameters of the controller. In addition to classical methods, artificial intelligence optimization algorithms are widely used to determine these parameters.  The purpose of optimization is to achieve the “best” design relative to a set of prioritized criteria or constraints. These include maximizing factors such as productivity, strength, reliability, longevity, efficiency, and utilization. This decision-making process is known as optimization. Today, there are a lot of optimization algorithms to tune controller parameters. Optimum controller parameters can be found with less experience in a short time by using the optimization algorithms. Since these algorithms have the ability to find the global optimal solution in a nonlinear search space. One of the modern heuristic algorithms is the Artificial Bee Colony Algorithm (ABC) which implements a learning technique inspired by bee colonies. In this project, the optimum parameters of a PID controller are expected to be determined by using ABC. | |
| **Project Justification** | |
| **Novelty** | |
| **New aspects** | Within the scope of this project, one of the PID controls used in the literature will be taken as a model and the proposed method (ABC) will be applied to find more successful results. |
| **Complexity** | |
| **Challenging problem and issues** | The characteristic of the PID controller is affecting the controller coefficients and optimum parameters must be tuned for good control. |
| **Related computer science fields and subfields** | Artificial Intelligence, Optimization, System Identification, PID, ABC |
| **Tools** | Matlab, Python |
| **Risk involved** | |
| **Potential problems and alternative solutions** | If the algorithm performance is low, a different algorithm will be applied to the problem. |
| **Minimum work required** | 4 MONTHS(3 students) |
| **Prerequisites** | Having quite good knowledge of artificial intelligence is a must to work in this project. In addition, it is necessary to have an oral interview with Dr. Bulent HAZNEDAR, to get more information about the project details. |