香港城市大學
City University of Hong Kong

Discovery-based education in system modeling and control: Integrating interactive learning and real-scene operations to inspire new scientific innovations

Project Number: 6000815

Principal Investigator: Dr. Lu LIU

Grant Type: TDG

Abstract:

The control of dynamic systems is an important topic for engineering students, and solutions have been provided for them to comprehend the relationship between theoretical design and engineering applications. Nowadays, most methodologies on this topic are transferred in classrooms through lectures. However, knowledge transfer through classes relies heavily on students' comprehension and is a process that can be inefficient, indirect, and tedious. The accessibility of engineering devices in this program will greatly improve students' knowledge digestion and inspire new thinking and exploration.

Therefore, I propose implementing an inter-institute communication and cooperation (IICC) program. In particular, through multiple ways such as competition participation, project execution, and knowledge transfer, students will be encouraged to learn how theories from lectures can be applied to the real world. The devices that will be made accessible to students include, but are not limited to, unmanned aerial vehicles, ground robots, and rehabilitation systems. This program will be carried out in three phases.

- Phase I is program preparation, and there will be four tasks at this stage. First, some senior students who are interested will be enrolled. Students with relevant educational backgrounds will be especially preferred. Second, the principal investigator (PI) will contact closely related research institutes and recruit several research assistants, such as experienced master's and Ph.D. students. Third, led by the PI, the assistants and students will determine the details of the program, such as time schedule, participant grouping, and task designation. Finally, the PI will design measurement rubrics to evaluate the students' performance in Phase II.

- Phase II is program implementation, and there will be three tasks at this stage. First, with supervision from the assistants and cooperation among all participants, the enrolled students will execute the program, the activities may include competition participation, program cooperation, and knowledge transfer. Second, after the main body of the program has been executed, the students will be required to summarize the obtained results in the form of official reports. Finally, with the help of the PI and the assistants, some potential results obtained from this program may be systematically

organized and published in the form of patents, conference/journal papers, guidelines for laboratory sessions, etc.

- Phase III is performance evaluation, and there will be two tasks at this stage. First, the students will be required to submit final reports. Then, to show their achievements in the program, an official oral presentation will be required. Finally, using the rubrics designed in Phase I, a peer review will be carried out to evaluate students' performance in Phase II.

The goal of this program is to provide a nutritious environment that is essential for students. On the one hand, we anticipate that this program will offer opportunities for students to take an active role in learning and thinking. On the other hand, their personal capabilities in terms of communication, cooperation, and time and schedule management will be greatly enhanced. Moreover, this program will enable students to develop more concrete ideas regarding their future career development in academia, industry, and entrepreneurship.