

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : ARAKELYAN Given names : Vigen

Status (prof., assistant prof., ...) : Full Professor

Laboratory : Research them "Mecaproce" (INSA Rennes / LS2N UMR6004) Website address :

Institution : Institut National des Sciences Appliquées (INSA) of Rennes Website address : www.insa-rennes

Scientific competence of the supervisor:

Since joining Department Mechanical and Control Systems Engineering at INSA in 2002, Professor Vigen Arakelian has taught kinematics and dynamics of mechanisms, mechanical systems and Robotics. His research interests span mechanics of robots, robot rehabilitation devices, control of mechanical systems, synthesis of high-speed machines and parallel manipulators, numerical simulation and optimization of mechanical systems by using ADAMS software. He is author of three books devoted to the study of balancing, kinematics and mobility of mechanisms and robot manipulators, four edited books with Springer and more than 150 scientific publications, as well as 23 inventions.

Two major publications in the field proposed for the PhD :

1. V. Arakelian, S. Briot. Balancing of linkages and robot manipulators. Advanced methods with illustrative examples, Springer, 2015, 291p. (ISBN: 978-3-319-12489-6).
2. Gravity compensation in robotics (Ed. V. Arakelian), Springer, 2022 (ISBN 9783030957490)

Website address of the personal page :

Supervisor's email : vigen.arakelyan@insa-rennes.fr

Description of the research work proposed for a PhD **Topic # (see list) :** VI-7

Title : DESIGN OF GRAVITY-COMPENSATION ADAPTIVE SYSTEMS FOR ROBOT MANIPULATORS

Subject :

Within the framework of the PhD thesis, a new gravity compensation system must be developed. This new balancing solution should be able to compensate for the gravity effects of the manipulated payload, which can vary. Contrary to most of gravity balancing techniques capable of compensating for the gravitational effects of loads, this compensation system must be energy efficient, i.e. the adaptation to the new manipulated payload should not require a lot of energy inside the system. Simulations of the mechanical systems with ADAMS will have to be carried out in order to confirm the effectiveness of the proposed approach. The proposed design concept will be validated via demonstrators.

Keywords :

gravity compensation, statique balancing, input torques, motion equations, optimisation

Expected collaborations :

Background required from the applicant :

- Modelling of serial robots.
- Force analysis and optimization knowledge.
- Study of mechanisms and programming in Matlab/Simulink.
- Familiarity with the softwares ADAMS and CATIA will be appreciated.

Existence of a PDF file detailing the proposal ("yes" or "no") : Yes

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