

Seminar

Wednesday, 22 October 2025

16:30, D011

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Title: Intelligent monitoring system for condition of a tool wear on a CNC machine based a data-driven multiphysics model

Abstract: During the CNC machining process, tool wear significantly impacts product quality, machinery efficiency, and maintenance costs. Thus, monitoring tool conditions is essential. This research aims to develop a solution for monitoring cutting tool wear during CNC machining, leveraging a data-driven multiphysics model. The research is structured as follows: First, a comprehensive multiphysics model is developed to describe the CNC machining process. An IoT system is then designed and implemented to collect real-time data from the machining process. Subsequently, a data-driven model is constructed using the collected data to capture the dynamics of the machining process. This data-driven model is used to refine and enhance the multiphysics model, resulting in a hybrid model with improved accuracy, efficiency, and predictive capability. Finally, a tool condition monitoring system is developed, utilizing fault diagnosis techniques based on the hybrid model.



Short bio: [Phuong-Tung Pham](#) received his B.S. and M.S. degrees in mechanical engineering from Ho Chi Minh City University of Technology, Vietnam, in 2016 and 2018, respectively, and Ph.D. degree in the School of Mechanical Engineering, Pusan National University, South Korea, in 2022. Currently, he is working as an Assistant Professor at Ho Chi Minh City University of Technology, Vietnam. His research interests include adaptive control, vibration control, multiphysic modelling, and artificial intelligence.