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DATA-DRIVEN MODEL FOR CLEARANCE DETECTION USING NEURAL NETWORKS

Tien Vuong Nguyen[a], Antonio Joaquín Rodríguez González[b], Grzegorz Orzechowski[a], Aki Mikkola[a], Jin-Gyun Kim[c], and Francisco Javier González Varela[b]

[a]Department of Mechanical Engineering
LUT University, Yliopistonkatu 34, 53850, Lappeenranta, Finland
Vuong.Nguyen@lut.fi, Grzegorz.Orzechowski@lut.fi, Aki.Mikkola@lut.fi

[b]Mechanical Engineering Laboratory - CITENI
University of La Coruña, Industrial Campus s/n, 15403, Ferrol, Spain
Antonio.Rodriguez.Gonzalez@udc.es, F.Gonzalez@udc.es

[c]Department of Mechanical Engineering (Integrated Engineering)
Kyung Hee University, Yongin-si, Gyeonggi-do, 17104, Republic of Korea
Jingyun.Kim@khu.ac.kr

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ABSTRACT

Clearance detection plays a vital part in mechanical engineering, especially in dynamic systems. Identifying the characteristics and location of the clearances that affect a mechanical system provides critical information about which components are affected. It helps to determine the appropriate maintenance and corrective actions. In the past, traditional methods for clearance problem detection were conducted by developing mathematical-based models to describe the behavior of mechanical systems. However, these methods usually required precise modeling of the system, for example, choosing the appropriate variables, leading to the inability to capture real-world complexities. Furthermore, they could be quite time-consuming, costly, and unable to adapt to dynamic systems. Recent studies (e.g. [1]) have utilized neural network models for predicting or simulating the behavior of dynamic systems but have not specifically addressed clearance detection. In this paper, we propose a data-driven method using neural networks for detecting clearance problem information, including their location and size. A multibody system simulator uses mechanical parameters such as mass or inertia as inputs to provide position, velocity, acceleration, and force data. Our method then utilizes these sensor data as input for the neural network, which is demonstrated to capture the nonlinearity characteristics compared to traditional mathematical models, resulting in significant improvements regarding efficiency and adaptability.

REFERENCES

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