<div align="center">**Research topics for graduate students for 2024**</div>

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Department of Mechanical Engineering

Acceptable course(s)

➢ Master's Degree

Research Topics

My research interests include design engineering and humanware engineering to enable human designers to design excellent products and services that provide new values to people's lives and society by exerting their creativity enhanced with information technologies. Following are a few research topics.

1. Design ideation informatics (Design knowledge management for problem solving)

We proposed a semistructured contradiction matrix using not TRIZ features but physical quantity descriptions in SI unit. We confirmed that similarity calculation between physical quantities in problem to be solved and those stored in semistructured contradiction matrix is effective to manage knowledge for problem solving ideation [1].

2. Game design methodology to avoid negative UX without compromising positive UX

We proposed a game design methodology of preventing negative user experience (UX) of the game without reducing positive UX. Through a trial on controlling the game parameters of "Breakout" such as ball speed and paddle size, we indicated a possibility of inducing the user to terminate the game contentedly [2].

3. Computer-aided fault tree analysis for high-reliable and safety design

We proposed a new design knowledge management approach called quantity dimension indexing and computerized support for fault tree analysis such as the verification of consistency of a fault tree and fault tree construction advice [3].

Articles Related to Research Topics

[1] Murakami, T., Knowledge Management for Problem Solving Using Semistructured Contradiction Matrix Based on Physical Quantity Description, *22nd International Conference on Engineering Design (ICED 2019)*, (2019), pp. 1983-1992. [DOI: 10.1017/dsi.2019.204]

[2] Hironaka, E., and Murakami, T., Game Design Methodology Considering User Experience in Comprehensive Contexts (Trial on Inducing Player to Terminate Game Contentedly by Motivation Control), *Advances in Human Factors in Wearable Technologies and Game Design*, (2018), pp. 390-402. [DOI: 10.1007/978-3-319-94619-1_39]

[3] Hiraoka, Y., Murakami, T., et al., Method of Computer-Aided Fault Tree Analysis for High-Reliable and Safety Design, *IEEE Transactions on Reliability*, **65**, 2 (2016), pp. 687-703. [DOI: 10.1109/TR.2015.2513050]

Lab. Web page: https://www.design.t.u-tokyo.ac.jp/people/murakami/