Research topics for graduate students for 2024

Professor Gentiane Venture

Department of Mechanical Engineering

Acceptable course(s)

- Master's Degree
- Doctoral Degree

Research Topics

Our lab conducts research in the field of robotics for a sustainable and fair society. Our research activities take three main axes: human motion science, intelligent control, and life with robots. We welcome candidates with a diverse background interested in tackling contemporary and future issues, curious and who want to pioneer robotics.

1. Human motion science: motion analysis from ground force reaction

The way we interact with our environment through forces is rich in information. It contains information about movement, individuals and expressivity. This research projects builds on our past work [1] and will investigate further the richness of ground reaction forces to understand better human movements and related dysfunctions.

2. Intelligent control

We aim at developing novel controllers for robots, be it for industrial or presence robots, that can take into consideration not only the humans around them but also the environment. Our controllers enable robots to use non-verbal communication and communicate their state and information they can collect. [2,3]

3. Living with robots: Slow technology and life-long robots

What about building a robot using sustainable materials and that you can keep your all life because it evolves and adapts with time? Using the concept of slow technology, reinforcement learning and renewable materials from biomass this project explores the possibilities to create machine intelligence for the super-long time interaction and design robots for a lifetime [3,4].

Articles Related to Research Topics

[1] V. Hernandez, D. Kulic, G. Venture, **Adversarial autoencoder for visualization and classification of human activity: application to Wii Balance Board**, J. of Biomechanics, 2020.

[2] E. Coronado, T. Shinya, G. Venture, **Hold My Hand: Development of a Force Controller and System Architecture for Joint Walking with a Companion Robot**, Sensors, 23(12), 5692, 2023.

[3] P. Osorio, R. Sagawa, N. Abe, G. Venture, **A Generative Model to Embed Human Expressivity into Robot Motions**, Sensors, 24, 569, 2024.

[4] S. Capy, P. Osorio, S. Hagane, C. Aznar, D. Garcin, E. Coronado, D. Deuff and G. Venture, **Yokobo: A Robot to Generate Links Between Users**, Machines, Vol. 10, Issue 8, 2022.

Lab. Web page: http://www.gvlab.jp