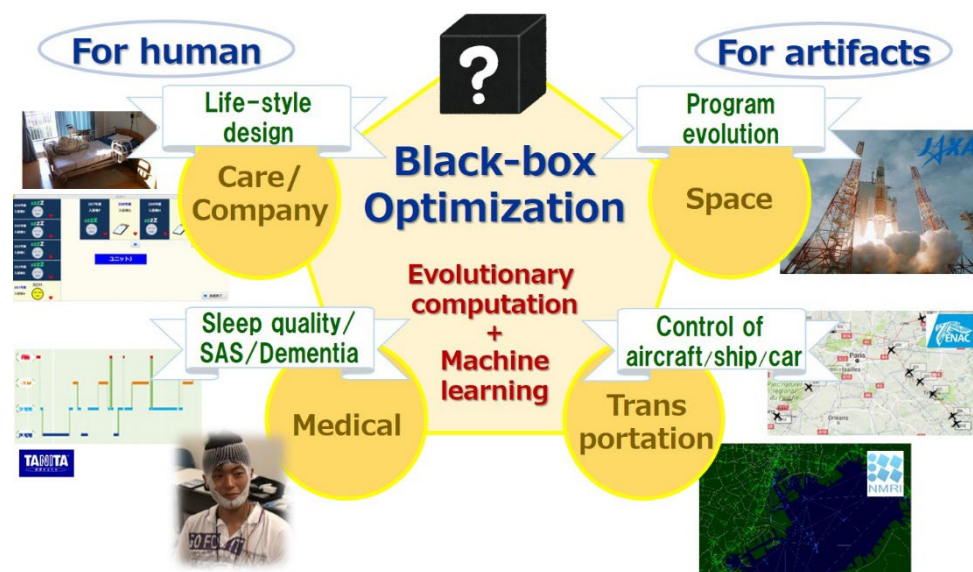


Name	Prof. Keiki Takadama	Location	Hongo (in Iba Lab. / Asano)	Research Area	Soft computing
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## AI technology for adapting complex environments: From medical to space applications

Since not only our world but also our body changes every day, it is important to smartly adapt to its change at the several different levels. However, “the optimal solution for today” is not always the same as “the optimal solution for tomorrow”, which means that even recent deep learning and generative AI have some significant limitations because of learning from the “past” data. To overcome this issue, Takadama laboratory explores the new AI technology that can tackle the black-box problems where a future optimal solution is unknown and/or often changes, and conducts both the basic research and the applied research. Some of them and future research are summarized as follows.



### AI technology for human

“What should we do for a better health and for a productivity improvement?” – the answer to this question is unknown but is a significant concern of elderly persons and workers. For this issue, we succeeded to improve a daily performance by designing the appropriate lifestyle and strengthen an immunity to the virus by improving sleep quality. Our method can detect dementia and sleep apnea syndrome by biological data acquired from a mattress sensor and a smart watch.

### AI technology for artifacts

“What should we cope with the unexpected situations in space or disaster?” – the answer to this question is also unknown but a satellite and a transportation system should maintain their functions even in such situations. For this issue, our small satellite that could evolve its program was launched, and the method for controlling the aircrafts, ships, and cars was explored. The self-location estimation method for SLIM was developed with JAXA.

### Adaptation-based methods

To develop the AI technologies described above, they require the method that can adapt to any change. For this issue, we conducted the research on the evolutionary computation in addition to machine learning (e.g., reinforcement learning, deep learning, meta-learning), multiagent system, swarm intelligence, and data-mining.

### About laboratory

- Takadama laboratory has just been launched in 2024. You are all welcome to join the laboratory. Please feel free to contact by e-mail.
- The research topics are not limited to as described above. You can conduct any research which has the same direction of Takadama laboratory.
- Takadama laboratory is planning to join Iba laboratory to discuss your research because of similar interests.
- Contact : [takadama@g.ecc.u-tokyo.ac.jp](mailto:takadama@g.ecc.u-tokyo.ac.jp)