Takashi Inagaki

Updated on: November 12, 2024

About

An optimist and fanatic to convert our analog body to a digital world to enable us to predict inherently complicated biological systems. Familiar with cell biology, software engineering, and a little bit of robotics. A firm believer of automation and computation in biological research for better reproducibility, efficiency, and wider exploration of the unknown.

Education

PhD in Biomedical Engineering (Sep. 2024 –)

Department of Biomedical Engineering, Samueli School of Engineering
University of California, Irvine, US

MSc in Engineering (Apr. 2022 - Mar. 2024)

Department of Mechanical Systems Engineering, Graduate School of Engineering
Nagoya University, Japan
Focus: Biomechanics

BSc in Engineering (Apr. 2018 - Mar. 2022)

Department of Mechanical and Aerospace Engineering, Faculty of Engineering
Nagoya University, Japan
Focus: Biomechanics

High School Diploma (Apr. 2015 - Mar. 2018)

Chigusa High School, Aichi, Japan

Research Experience

Master's Student, Biomechanics Lab at Nagoya University, Japan (Apr. 2022 - Present)

PI: Prof. Takeo Matsumoto
Ongoing research on the mechanical properties of spheroids.

Undergraduate Student, Biomechanics Lab at Nagoya University, Japan (Apr. 2021 - Mar. 2022)

PI: Prof. Takeo Matsumoto
Supervised by Prof. Takeo Matsumoto in a leading lab focusing on the mechanical characteristics of biological tissues. Created 3D bone cell aggregates and explored osteoblast/osteocyte differentiation through 3D imaging and Python analysis, culminating in a first-authored publication (Inagaki et al., Integr. Biol., 2023). (≈40 hrs/wk)

Research Assistant, Assistive Robotics Group at Nagoya University, Japan (Aug. 2019 - Mar. 2021)

PI: Prof. Yoji Yamada
Collaborated with Prof. Yoji Yamada's group on human gait stability. Analyzed motion capture data to derive and compare various gait stability indices, establishing their relationship to gait parameters. Authored a first-author publication (Inagaki et al., Nagoya J. Med. Sci., 2023). (≈10 hrs/wk)

Technical Support Staff, Division of Homeostatic Development at National Institute for Physiological Sciences, Japan (Aug. 2020 - Feb. 2021)

PI: Prof. Junichi Nabekura
Worked with Prof. Masakazu Agetsuma and Prof. Junichi Nabekura, assisting in the analysis of two-photon calcium imaging data from mice, enhancing computational efficiency with MATLAB. Supported in creating figures for publication (Agetsuma et al., Nat. Comm., 2023). (≈10 hrs/wk)

Work Experience

Software Engineer at MAP IV, Inc., Japan (Part-time, July 2023 - Current)

Engaged in a startup specializing in point cloud mapping technology for autonomous vehicles. Developing a web interface for point cloud data analysis and visualization for autonomous vehicle mapping. Working in a dynamic startup environment to deepen my understanding of the autonomous industry. (≈12 hrs/wk)

Keywords: Python, FastAPI, Linux, Ubuntu, ROS, Vue.js, Docker, GPU, CUDA, GitHub, Jira

Research Engineer at Corpy&Co., Inc., Japan (Part-time, June 2022 – Oct. 2023)

Contributed to a Japanese/French startup focused on creating machine learning platforms for industrial applications. Engineered full-stack solutions and integrated advanced deep learning models (e.g., YOLO) within web applications, working in a multicultural startup environment with a focus on machine learning and image analysis technologies. (≈16 hrs/wk)

Keywords: Django, FastAPI, Vue.js, Celery, RabbitMQ, Docker, Windows, Linux, GitLab

Diploma Student / Intern at SAP Japan (Part-time, Oct. 2022 - Mar. 2023)

Worked with a multinational enterprise software corporation to develop demo applications demonstrating software integration capabilities. Contributed to the development of demo applications demonstrating software integration potential, including image object detection with machine learning. Engaged in multinational corporate settings. (≈12 hrs/wk)

Keywords: Python, Java, JavaScript, Object Detection

Summer Internship (Software Engineer) at freee K.K (Full-time, Aug. 2022 - Sep. 2022)

Joined a leading Japanese company offering business and accounting software solutions for a full-time two-week internship. Joined an international team for a full-time, two-week internship to develop an XML decode feature, marking my first exposure to a global team in a large Japanese enterprise. (≈40 hrs/wk)

Keywords: Ruby on Rails, React, TypeScript, Docker

Software Developer at N2i, inc., Japan (Part-time, Apr. 2019 – Apr. 2022)

Initiated professional programming career at a startup delivering AI and HR software solutions to Japanese companies. Focused on backend development for a human resource web application, gaining essential coding skills and professional ethics in a team setting. (≈16 hrs/wk)

Keywords: Node.js, Express, Python, MySQL, Docker, Redis, Vue

Publications (Google Scholar), (ORCID)

Preprints & Submitted

1. **T. Inagaki**, A. Kato, K. Takahashi, H. Ozaki, G. N. Kanda, "LLMs can generate robotic scripts from goal-oriented instructions in biological laboratory automation", arXiv, vol xx, pp xx-xx, 2023

Journal Papers

1. **T. Inagaki**, J. Kim, E. Maeda, and T. Matsumoto, "Macroscopic creep behavior of spheroids derived from mesenchymal stem cells under compression", Journal of the Mechanical Behavior of Biomedical Materials, vol xx, pp xx-xx (Accepted), 2024
2. M. Agetsuma, I. Sato, Y. R Tanaka, L. Carrillo-Reid, A. Kasai, Y. Arai, M. Yoshimoto, **T. Inagaki**, H. Yukawa, H. Hashimoto, J. Nabekura, T. Nagai, "Activity-dependent organization of prefrontal hub-networks for associative learning and signal transformation", Nature Communications, 14, 5996, 2023

3. **T. Inagaki**, J. Kim, K. Tomida, E. Maeda, and T. Matsumoto, "3D quantitative assessment for nuclear morphology in osteocytic spheroid with optical clearing technique", Integrative Biology, 15, zyad007, 2023
4. **T. Inagaki**, Y. Akiyama, S. Okamoto, T. Mayumi, and Y. Yamada, "Relationship between gait stability indices and gait parameters comprising joint angles using walking data of 288 people", Nagoya Journal of Medical Science, 852, 211, 2023
5. J. Kim, **T. Inagaki**, J. Sunaga, T. Adachi, & T. Matsumoto, "Effect of chemically induced osteogenesis supplements on multicellular behavior of osteocytic spheroids" Biochemical and Biophysical Research Communications, 622, 79-85, 2022

International Conference

1. **T. Inagaki**, J. Kim, E. Maeda, and T. Matsumoto, "LOCAL MICROMECHANICAL PROPERTY MEASUREMENT ON CROSS-SECTIONS OF HUMAN MESENCHYMAL STEM CELL-DERIVED SPHEROIDS", 10th International Conference on Mechanics and Materials in Design (M2D2024), Nagoya, Japan, September 4, 2024
2. **T. Inagaki**, J. Kim, E. Maeda, and T. Matsumoto, "MECHANICAL CHARACTERIZATION OF HUMAN MESENCHYMAL STEM CELL-DERIVED OSTEOCYTIC SPHEROIDS BY UNIAXIAL COMPRESSION TESTING", Summer Biomechanics, Bioengineering, & Biotransport Conference 2024, ID, Wisconsin, USA, June 2024
3. **T. Inagaki**, J. Kim, E. Maeda, and T. Matsumoto, "Evaluation of Elastic and Viscoelastic Properties of Spheroids Derived from Human Mesenchymal Stem Cells during Ossification Process with Uniaxial Compression Test", 2023 Melbourne-Nagoya Joint Research Workshop, Melbourne, Australia, September 2023
4. J. Kim, **T. Inagaki**, E. Maeda, T. Adachi, and T. Matsumoto, "Biomechanical analysis of osteocytic spheroids for bone tissue engineering applications", International Conference on Precision Engineering and Sustainable Manufacturing, Okinawa, Japan, July 2023
5. J. Kim, **T. Inagaki**, T. Adachi, T. Matsumoto, "Modulation of mechanical environment to induce osteocyte differentiation of mesenchymal stem cells", The 9th World Congress of Biomechanics, Taipei, Taiwan, July 2022
6. T. Iwasaki, S. Okamoto, Y. Akiyama, **T. Inagaki**, and Y. Yamada, "Kinematic gait stability index highly correlated with the margin of stability: Concept and interim report", Proceedings of 2021 IEEE/SICE International Symposium on System Integration SII, pp. 347-350, Fukushima, Japan, March 2021
7. T. Iwasaki, S. Okamoto, Y. Akiyama, **T. Inagaki**, and Y. Yamada, "Walking motions with high margin-of-stability values," Proceedings of 2021 IEEE International Conference on Intelligence and Safety for Robotics ISR, pp. 224-228, Nagoya, Japan, March 2021
8. **T. Inagaki**, S. Okamoto, T. Iwasaki, Y. Akiyama, and Y. Yamada, "Comparison of gait variability and stability indices," Proceedings of 2020 IEEE 2nd Global Conference on Life Sciences and Technologies LifeTech, pp. 72-74, Kyoto, Japan, March 2020

Conference in Japan

1. **稲垣 貴士**, キム ジョンヒョン, 前田 英次郎, 松本 健郎, "石灰化過程にあるヒト間葉系幹細胞由来スフェロイド断面の局所力学特性・凹凸計測", 生体医工学シンポジウム2024, 東京, 日本, 9/12-14/2024
2. キム ジョンヒョン，**稲垣 貴士**，前田 英次郎，松本 健郎, "ヒト間葉系幹細胞由来スフェロイドの圧縮に対する力学挙動評価", 第47回日本バイオレオロジー学会年会, XX, Tokyo, Japan, June 2024
3. **稲垣 貴士**キムジョンヒョン，前田英次郎，松本健郎，"石灰化部位の力学環境推定に向けたヒト間葉系幹細胞由来スフェロイド断面内局所力学特性計測", 第36回バイオエンジニアリング講演会, 1P30, Nagoya, Japan, May 2023
4. **稲垣 貴士**，キムジョンヒョン，前田英次郎，安達泰治，松本健郎，"ヒト間葉系幹細胞由来骨細胞スフェロイドの単軸圧縮試験による力学特性評価：スフェロイドの塑性変形メカニズム解明" Mechanical Characterization of Human Mesenchymal Stem Cell-Derived Osteocytic Spheroids by Uniaxial Compression Testing: Elucidation of Plastic Deformation Mechanism of Spheroids，第34回バイオフロンティア講演会 The Proceedings of the JSME Conference on Frontiers in Bioengineering, Yamaguchi, Japan, 1E16, Dec 2023
5. **稲垣 貴士**，キムジョンヒョン，前田英次郎，松本健郎，"単軸圧縮試験による石灰化過程のヒト間葉系幹細胞由来スフェロイドの弾性及び粘弾性評価"，金鯱バイオメカニクス研究会, 愛知, 日本, Sept 2023
6. **稲垣 貴士**，キムジョンヒョン，前田英次郎，安達泰治，松本健郎，"単軸圧縮試験による石灰化過程のヒト間葉系幹細胞由来スフェロイドの弾性及び粘弾性評価" Elastic and viscoelastic evaluation of human mesenchymal stem cell-derived spheroids during calcification by uniaxial compression testing，2023機械学会年次大会 The 2023 Mechanical Engineering Society Annual Meeting, S021p-01, Tokyo, Japan, Sept 2023
7. **稲垣 貴士**, "LLMs can generate robotic scripts from goaloriented instructions in biological laboratory automation", AIロボット駆動科学シンポジウム2023, P8, Tokyo, Japan July 2023
8. キムジョンヒョン，**稲垣 貴士**，前田英次郎，安達泰治，松本健郎, "Measurement of multicellular behavior and mechanical properties in 3D osteocytic spheroids", The 62nd Annual Conference of Japanese Society for Medical and Biological Engineering, Nagoya, Japan, June 2023
9. **稲垣 貴士**，キムジョンヒョン，前田英次郎，松本健郎，"圧縮試験によるヒト間葉系幹細胞由来スフェロイドの機械特性評価"，第33回バイオフロンティア講演会, 神戸, 日本, 1E16, Dec 2022
10. **T. Inagaki**, J. Kim, E. Maeda, T. Matsumoto, "3D Image Analysis for Nuclear Morphology in Osteocytic Spheroids with Optical Clearing Technique", The 61st Annual Conference of Japanese Society for Medical and Biological Engineering, O1-4-3-6, Niigata, Japan, June 2022
11. **稲垣 貴士**, キム ジョンヒョン, 前田 英次郎, 松本 健郎, "組織透明化手法による3次元骨細胞スフェロイド内部の細胞核形状評価"3D assessment of nuclear morphology in osteocytic spheroids by optical clearing method, 第53回学生員卒業研究発表会講演会 TOKAI ENGINEERING COMPLEX 2022 TEC22, Online, March 2022
12. **T. Inagaki**, Y. Akiyama, S. Okamoto, T. Mayumi, and Y. Yamada, "Relationship between gait stability indices and gait

parameters comprising joint angles using walking data of 300 people", Proceedings of The Robotics and Mechatronics Conference 2021, Osaka, Japan, June 2021

Invited Talks

1. **T. Inagaki**, J. Kim, E. Maeda, and T. Matsumoto, "LOCAL MICROMECHANICAL PROPERTY MEASUREMENT ON CROSS-SECTIONS OF HUMAN MESENCHYMAL STEM CELL-DERIVED SPHEROIDS", 10th International Conference on Mechanics and Materials in Design (M2D2024), Nagoya, Japan, September 4, 2024
2. **稲垣 貴士**, 神田 元紀, "ロボット×LLM：自動分注ロボットの動作生成" Robotics x LLM: Automated Pipetting Robot Motion Generation, Informatics In Biology, Medicine and Pharmacology 2023, Chiba, Japan, September 2023
3. **稲垣 貴士**, "GPT-4にOT-2のPythonスクリプト生成させてみた〜AI活用最前線〜" Experimenting with GPT-4 for Generating Python Scripts for OT-2: The Forefront of AI Utilization, Laboratory Automation月例勉強会 / 2023.04,, Kanagawa, Japan, April 2023

Funding

1. Nagoya University Mechanical and Aerospace Engineering Alumni Association Student Overseas Study Grant, ¥75,000, 2024
2. JASSO Scholarship Type 1 (¥2,112,000) Half Exemption, JASSO, ¥1,056,000, 2022 - 2024
3. Doctoral Research Expense Grant, Graduate School of Engineering, Nagoya University, ¥250,000 x 3 years, 2024 - 2027

Awards and Fellowships

1. Student Paper Competition Finalist, "MECHANICAL CHARACTERIZATION OF HUMAN MESENCHYMAL STEM CELL-DERIVED OSTEOCYTIC SPHEROIDS BY UNIAXIAL COMPRESSION TESTING", Summer Biomechanics, Bioengineering, & Biotransport Conference 2024, June 2024
2. Student Support Fellowship, $2900 monthly stipend for 6 months and $2500 initial relocation bonus, at University of California, Irvine for 2024 Fall and 2025 Winter Quarters
3. Kinshachi Biomechanics Study Group Prize Grand Prize 2023.9.25 in Japanese Received the best presentation award among more than 50 students for my oral presentation "Mechanical Characterization of Human Mesenchymal Stem Cell-Derived Spheroids by Glass Plate Compression Experiment" in a joint workshop held by Nagoya University and Nagoya Institute of Technology in Japan.
4. Best presentation award, 2022, TOKAI ENGINEERING COMPLEX 2022 TEC22, for "**T. Inagaki**, J. Kim, E. Maeda, T. Matsumoto: Evaluation of cell nucleus shape inside 3D bone cell spheroid by tissue transparency method" 2022.3.4 in Japanese
5. Best student paper award, 2021 IEEE International Conference on Intelligence and Safety for Robotics, for "T. Iwasaki, S. Okamoto, Y. Akiyama, **T. Inagaki**, and Y. Yamada: Walking motions with high margin-of-stability values" 2021.3.6
6. Best presentation award, 2020 The Society of Instrument and Control Engineers Systems Integration, for "T. Iwasaki, S. Okamoto, Y. Akiyama, **T. Inagaki**, and Y. Yamada: Gait stability index with high correlation to mechanical stability margin" 2020.12.25 in Japanese

Media

1. 「大ざっぱな指示でも驚異のプログラミング　研究自動化へ優秀な「助手」に〜ＧＰＴインパクト」, 中日新聞, https://www.chunichi.co.jp/article/741077