**SWAGATA DAS**

**swagata.das.2013@gmail.com**

**WORK EXPERIENCE**



Project Assistant Professor, Hiroshima University (Oct 20’ – present)

Engaged in the project called “Smart society for enjoying long healthy life - Developing AI smart coaching technology that facilitates voluntary skill-up for elderlies” commissioned by the New Energy and Industrial Technology Development Organization (NEDO), Japan under Prof. Yuichi Kurita.

**EDUCATION**



PhD – Soft robotics, System Cybernetics (Apr 18’ – Oct 20’) **Hiroshima** **University**, Higashihiroshima, Japan–7390046.

CGPA – 3.4/4

(under Prof. Yuichi Kurita)

TAOYAKA Program M.S. – System Cybernetics (Apr 16’ – Apr 18’) **Hiroshima** **University**, Higashihiroshima, Japan–7390046.

CGPA – 3.5/4

M.Tech – Electronics Design and Technology (July 13’ – June 15’) **Tezpur Central** **University**, Tezpur, Assam, India - 784028.

CGPA - 9.45/10

(Project supervised and completed at **Council of Scientific and Industrial Research- Central** **Electronics Engineering Research Institute, India** under Prof. Jagdish Lal Raheja)

B.Tech – Electronics and Communication Engineering (July 09’ – May 13’) **North Eastern Regional Institute of Science and Tech. (NERIST)**, Itanagar, India - 791109.CGPA - 4.91/5

**TECHNICAL SKILLS**



Languages: C, C++, C#, Fortran, i8085, masm (32-bit), MATLAB, Python

Simulation and interface: Opensim, Simulink, Blender, Unity, LaTex, Figma, Sketch, Adobe XD

Data processing: MATLAB, Mathematica, R, Multisim

Hardware: Arduino, Expressif ESP32, OptiTrack Motive motion capture, Delsys Trigno Wireless EMG Sensors, Vive/Oculus VR, LeapMotion, GSR (Galvanic Skin Response) sensors, Emotiv EPOC/Insight, Pneumatic control modules (sensors & valves)

**LANGUAGES**



English: Fluent (GRE: 305; TOEFL iBT: 85; TOEIC: 945)

Japanese: Intermediate (JLPT N3: 94)

Hindi: Fluent

**MAJOR PROJECTS**



**(Oct 2020 – present)**

***Work Title:*** *Gesture recognition considering the estimation of Signal-Dependent Noise (SDN)-based motion variation*

***Guidance:*** *Prof. Yuichi Kurita, Hiroshima University, Japan*.

* Motion variations occur irrevocably in repeated human gestures. Gesture recognition accuracy gets affected due to these variations. This issue can be addressed by increasing the number of training data samples. But this increases load on the subjects and experimenter.
* We proposed an algorithm to predict motion variations in gestures by superimposing SDN (Signal-Dependent Noise) on muscle activity data.
* These predicted data were used to increase the gesture recognition accuracy of gestures with high motion variations such as chop, punch, and slap.

**(Oct 2020 – present)**

***Work Title:*** *Developing a VR-based squat exergame for all ages*

***Guidance:*** *Prof. Yuichi Kurita, Hiroshima University, Japan*.

* Sedentary lifestyle can be effectively tackled through gaming interfaces that also include physical movements of the body. This research is a similar approach directed to all age groups.
* We used soft actuators to provide dynamically controlled momentary assistance and resistance and thus, provide motivation to finish the exercise task.
* We also use AI (Artificial Intelligence) to perform assessment of the user’s lower limb pre-workout.

**(Apr 2018 – Oct 2020)**

***Work Title:*** *ForceArm—Soft and wearable Upper limb force-feedback*

***Guidance:*** *Prof. Yuichi Kurita, Hiroshima University, Japan*.

* Developed a wearable force-feedback cum assistive support system using Pneumatic Gel Muscles (specially designed low-pressure artificial muscles).
* Used the prototype in four applications: VR (Virtual Reality) force-feedback, Navigation assistance, Rehabilitation training and Motor learning.

**(Apr 2016 – Apr 2018)**

***Work Title:*** *Force Your Hand—PAM Enabled Wrist Support*

***Guidance:*** *Prof. Yuichi Kurita, Hiroshima University, Japan*.

* Design and development of a wrist assist device using pneumatic artificial muscles and stretch sensors.
* During training and evaluation sessions, majority of subjects showed statistically significant reduction in their EMG while using the glove.

**(Jul 2014 – May 2015)**

***Thesis Title:*** *Robot control using Brain Computer Interaction*

***Guidance:*** *Dr. Ing. J. L. Raheja, CSIR-CEERI, Pilani, Rajasthan, India*.

* Extraction of DWT coefficients from EEG signals and then application of PCA (Principal Component Analysis).
* Training of a neural network using the data set for meaningful classification.
* Data processing of gyroscope data using Kalman filter for mouse emulation.
* Integration of the above-mentioned postulates into a GUI (Graphical User Interface) for driving a prototype robot through EEG signals.

**(Jul 2012 – May 2013)**

***Thesis Title:*** *Performance of a Hybrid MRC/SC Diversity Receiver over Rayleigh Fading Channel*

***Guidance:*** *Dr. A. Dinamani Singh, NERIST, Itanagar, Arunachal Pradesh, India.*

* Mathematical modelling of a hybrid MRC/SC receiver for Rayleigh fading channel.
* Calculation of outage probability and average bit error rate for the designed mathematical model for performance measure.

**PUBLICATIONS**



**Principal papers, books, and other publications**

1. Das, S., Sakoda, W., Ramasamy, P., Tadayon, R., Ramirez, A. V., & Kurita, Y. Feature Selection and Validation of a Machine Learning-Based Lower Limb Risk Assessment Tool: A Feasibility Study. In MDPI Sensors, vol. 21, no. 19. MDPI. 2021.
2. Gunarajulu, R., Kurita, Y., Cukovic, S., & Das, S.\*, Foot Biomechanics with emphasis on the Plantar Pressure Sensing: A review. In Revolutions in Product Design for Healthcare - Advances in Product Design and Design Methods for Healthcare. In Press. Springer. (\*Corresponding author)
3. Das, S., Ishibashi, Y., Minakata, M., & Kurita, Y. Estimating Signal-Dependent Noise (SDN)-based motion variations to enhance gesture recognition. Advanced Robotics. In press. Taylor & Francis.
4. Das, S., Kurita, Y., & Tadayon, R. Accessible Smart Coaching Technologies Inspired by Elderly Requisites. In Multimedia for Accessible Human Computer Interfaces. PP. 175-215. Springer. 2021.
5. Ramasamy, P., Das, S.\*, & Kurita, Y. Ski for Squat: A Squat Exergame with Pneumatic Gel Muscle-based Dynamic Difficulty Adjustment. In 23rd International Conference on Human-Computer Interaction (HCII), Online. PP. 449-467. Springer. 2021. (\*Corresponding author)
6. Das, S., Wongchadakul, V., & Kurita, Y. SmartAidView Jacket: Providing visual aid to lower the underestimation of assistive forces. In Proceedings of the Augmented Humans International Conference (AHs). PP. 152-156. ACM. 2021.
7. Das, S., & Kurita, Y. ForceArm: A wearable pneumatic gel muscle (PGM)-based assistive suit for the upper limb. In IEEE Transactions on Medical Robotics and Bionics, vol 2, no. 2, PP. 269-281. IEEE. 2020.
8. Das, S., Wongchadakul, V., Tadayon, R., & Kurita, Y. Creating illusive perceived assistive force using visual feedback. In IEEE International Conference on Systems, Man, and Cybernetics (SMC), PP. 3260-3267. IEEE. 2020.
9. Das, S., Thakur, C., & Kurita, Y. Force-feedback in Virtual Reality through PGM-based ForceHand glove. In IEEE/SICE International Symposium on System Integration (SII), PP. 1016-1021. IEEE. 2020.
10. Das, S., & Kurita, Y. Providing navigation assistance through ForceHand: a wearable force-feedback glove. In IEEE Global Conference on Signal and Information Processing (GlobalSIP), PP. 1-5. IEEE. 2019.
11. Das, S., Kishishita, Y., Tsuji, T., Lowell, C., Ogawa, K., & Kurita, Y. ForceHand glove: a wearable force feedback glove with pneumatic artificial muscles (PAMs). In IEEE Robotics and Automation Letters, vol 3, no. 3, PP. 2416-2423. IEEE. 2018.
12. Das, S., Tripathy, D., & Raheja, J. L. Real-time BCI System Design to Control Arduino Based Speed Controllable Robot Using EEG. Springer. 2018.

**Research papers/publications other than the above**

1. Das, S., Ishibashi, Y., Minakata, M., & Kurita, Y. Gesture recognition considering the estimation of signal-dependent noise (SDN)-based motion variation. In Proceedings of the Robotics Symposia (RS), PP. 217-220. 2021.
2. Kurita, Y., Thakur, C., & Das, S. Assistive Soft Exoskeletons with Pneumatic Artificial Muscles. In Haptic Interfaces for Accessibility, Health, and Enhanced Quality of Life, PP. 217-242. Springer. 2020.
3. Goto, T., Das, S., Wolf, K., Lopes, P., Kurita, Y., & Kunze, K. Accelerating Skill Acquisition of Two-Handed Drumming using Pneumatic Artificial Muscles. In Proceedings of the Augmented Humans International Conference (AHs), PP. 1-9. ACM. 2020
4. Kishishita, Y., Das, S., Ramirez, A. V., Thakur, C., Tadayon, R., & Kurita, Y. Muscleblazer: Force-Feedback Suit for Immersive Experience. In IEEE Conference on Virtual Reality and 3D User Interfaces (VR), PP. 1813-1818. IEEE. 2019.
5. Tadayon, R., Ramirez, A. V., Das, S., Kishishita, Y., Yamamoto, M., & Kurita, Y. Automatic Exercise Assistance for the Elderly Using Real-Time Adaptation to Performance and Affect. In International Conference on Human-Computer Interaction (HCII), PP. 556-574. Springer. 2019.
6. Goto, T., Das, S., Kurita, Y., & Kunze, K. Artificial Motion Guidance: an Intuitive Device based on Pneumatic Gel Muscle (PGM). In The 31st Annual ACM Symposium on User Interface Software and Technology Adjunct Proceedings (UIST), PP. 182-184. ACM. 2018.
7. Kishishita, Y., Ramirez, A. V., Das, S., Thakur, C., Yanase, Y., & Kurita, Y. Muscleblazer: a wearable laser tag module powered by PGM-induced force-feedback. In Proceedings of the First Superhuman Sports Design Challenge: First International Symposium on Amplifying Capabilities and Competing in Mixed Realities (SHS), PP. 1-6. ACM. 2018.
8. Das, S., Lowell, C. and Kurita, Y. Force Your Hand—PAM Enabled Wrist Support. In International AsiaHaptics conference, PP. 239-245. Springer. 2016.
9. Dinamani, A., Das, S., Bijendra, L., Shruti, R., Babina, S. & Kiran, B. Performance of a hybrid MRC/SC diversity receiver over Rayleigh fading channel. In International conference on Circuits, Controls and Communications (CCUBE), PP. 1-4. IEEE. 2013.

**ACADEMIC ACHIEVEMENTS**



* Awarded Excellent student by Graduate School of Engineering, Hiroshima University in 2018.
* Awarded gold medals by His Excellency **Late Dr. A. P. J. Abdul Kalam**, Ex-President of India and **Shri. Kapil Sibal**, ex-Union Minister of India for exceptional performance in academics at NERIST, Itanagar, India.
* Secured top position in academics and received gold medal during masters at Tezpur Central University.
* Secured all India rank of 4557 out of more than 210,000 students in Graduate Aptitude Test in Engineering (GATE) 2014.
* District level award winner in All India Talent Search examination and National Talent Search Examination, India.

**Invited Lectures**

1. CEDEC2018 (Computer Entertainment Developers Conference 2018), Yokohama, 一般社団法人コンピュータエンターテインメント協会: 空気圧人工筋を利用したウェアラブル力覚提示スーツ 2018. 08. 23
2. ICRA2017 (International Conference on Robotics and Automation 2017) Workshop on Advances and challenges on the development, testing and assessment of assistive and rehabilitation robots: Experiences from engineering and human science research, Singapore, Design and development of a PAM-enabled wrist assist glove 2017. 05. 29