

Souvik Das, Ph.D.

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Skills

Research Interest	📌	Human Factors and Ergonomics, Safety Engineering and Analytics, Risk Assessment, Virtual and Augmented Reality, Eye Movements Analysis, Artificial Intelligence and Machine Learning, Fuzzy Set Theory
Coding	📌	R, Python, HTML, C++
Softwares	📌	MATLAB, Delmia, LINGO, MINITAB, SPSS, SAS, ALOHA, RAMS Commander, MHMM, Safety Analytics Software, MS OFFICE, CPLEX, STATA, Unreal Engine, Unity, Solid works, Google Sketch-up, 3DS MAX, MAYA, Blender

Career Experience

June. 2023–Mar. 2024	📌	Visiting Scholar , School of Engineering Technology (SOET), Purdue University, West Lafayette, USA <ul style="list-style-type: none">Conceptualizing, planning, and executing innovative projects focused on <i>natural language processing and large language models</i> to analyse the large volumes of accident/incident narratives.
Sept. 2021–May. 2023	📌	Principal Research Scientist , Centre of Excellence in Safety Engineering and Analytics (CoE-SEA), IIT Kharagpur, India. <ul style="list-style-type: none">Engaged in conceptualizing, planning, and executing innovative projects focused on <i>occupational safety and ergonomics</i>, resulting in the publication of 3 high-impact journal articles.Collaborated with cross-functional teams to translate research findings into actionable insights, influencing the development of Industry 4.0 solutions aimed at enhancing situational awareness in the workplace.
Nov. 2023–Nov. 2024	📌	Associate Editor , Journal of Emerging Investigators, Inc. <ul style="list-style-type: none">Assigned reviewers with relevant expertise to submitted manuscripts.Managed review deadlines to ensure manuscripts continued to advance through the review process.Collated reviews into a cohesive Editor's Letter that was geared towards teaching young scientists how to transform their research into a formal publication.

Education Background

June. 2017 – Aug. 2023	📌	Doctor of Philosophy (PhD [Engg.]) in Safety Engineering and Analytics Thesis title: <i>Data Driven Modeling of Cognitive Workload using Eye Tracking Metrics</i> Department of Industrial and Systems Engineering, Indian Institute of Technology Kharagpur (IITKGP), India
Jul. 2015 – May. 2017	📌	Master of Technology (M. Tech.) [Post-Graduate] in Industrial Engineering and Management (CGPA: 8.84/10), Department of Industrial and Systems Engineering, Indian Institute of Technology Kharagpur (IITKGP), India.
Aug. 2010 – Jul. 2014	📌	Bachelor of Technology (B.Tech.) [Undergraduate] in Electrical Engineering (CGPA: 8.48/10), Department of Electrical Engineering, Regional Computer Centre Institute of Information Technology (RCCIIT), West Bengal, India.

Key Research Publications

Journal Articles

- 1 **Das, S.**, Khanwelkar, D. R., & Maiti, J. (2023). A semi-automated coding scheme for occupational injury data: An approach using bayesian decision support system. *Expert Systems with Applications*, 121610.
- 2 **Das, S.**, Garg, A., Khorania, Y., & Maiti, J. (2022). Dual hesitant z-number (dhzn), correlated distance, and risk quantification. *International Journal of Intelligent Systems*, 37(1), 625–660. [doi:10.1002/int.22642](https://doi.org/10.1002/int.22642)
- 3 Dhalmahapatra, K., **Das, S.**, & Maiti, J. (2022). On accident causation models, safety training and virtual reality. *International journal of occupational safety and ergonomics*, 28(1), 28–44.
- 4 Gupta, A. K., Pardheev, C. G. V. S., Choudhuri, S., **Das, S.**, Garg, A., & Maiti, J. (2022). A novel classification approach based on context connotative network (ccnet): A case of construction site accidents. *Expert Systems with Applications*, 202, 117281.
- 5 **Das, S.**, Garg, A., Maiti, J., Krishna, O., Thakkar, J. J., & Gangwar, R. (2021). A comprehensive methodology for quantification of bow-tie under type ii fuzzy data. *Applied Soft Computing*, 103, 107148.

- 6 **Das, S.,** Dhalmahapatra, K., & Maiti, J. (2020). Z-number integrated weighted vikor technique for hazard prioritization and its application in virtual prototype based eot crane operations. *Applied Soft Computing*, 94, 106419.
- 7 **Das, S.,** Maiti, J., & Krishna, O. B. (2020). Assessing mental workload in virtual reality based eot crane operations: A multi-measure approach. *International Journal of Industrial Ergonomics*, 80.
- 8 Garg, A., **Das, S.,** Maiti, J., & Pal, S. K. (2020). Granulized z-vikor model for failure mode and effect analysis. *IEEE Transactions on Fuzzy Systems*, 30(2), 297–309.
- 9 **Das, S.,** Garg, A., Pal, S. K., & Maiti, J. (2019). A weighted similarity measure between z-numbers and bow-tie quantification. *IEEE Transactions on Fuzzy Systems*, 28(9), 2131–2142.

Conference Proceedings

- 1 Bagchi, G. K., **Das, S.,** Garg, A., & Maiti, J. (2022). A safety function deployment model for improvement in safety related decision making: A case of transportation system. In *2022 international conference on data analytics for business and industry (icdabi)* (pp. 371–375). IEEE.
- 2 Garg, A., **Das, S.,** Dubey, S. K., & Maiti, J. (2022). Z-number based improved sustainability index for the selection of suitable suppliers. In *2022 international conference on data analytics for business and industry (icdabi)* (pp. 397–401). IEEE.
- 3 Kumar, P., Pradhan, S., **Das, S.,** Garg, A., & Maiti, J. (2022). A system thinking approach for evacuation during fire incidents considering systems dynamics. In *2022 international conference on data analytics for business and industry (icdabi)* (pp. 376–380). IEEE.
- 4 Sinha, N. K., Das, R., Sinha, S. B. K., Shalini, K., & **Das, S.** (2021). Prevention through design in major construction projects—case study from tata steel. In *2021 international conference on maintenance and intelligent asset management (icmiam)* (pp. 1–5). IEEE.
- 5 **Das, S.,** Dhalmahapatra, K., Maroo, P., & Maiti, J. (2018). A self-tuning neuromorphic controller to minimize swing angle for overhead cranes. In *2018 4th international conference on recent advances in information technology (rait)* (pp. 1–6). IEEE.
- 6 Dhalmahapatra, K., Pradhan, O., **Das, S.,** Singh, K., & Maiti, J. (2018). Prioritization of human errors in eot crane operations and its visualisation using virtual simulation. In *2018 4th international conference on recent advances in information technology (rait)* (pp. 1–6). IEEE.

Book Chapters

- 1 **Das, S.,** Das, J., Krishna, O., & Maiti, J. (2022). Image processing-based fire detection using iot devices. In *Machine vision for industry 4.0* (pp. 207–224). CRC Press.
- 2 **Das, S.,** Girdharwal, A., Maiti, J., & Krishna, O. (2022). Reconstruction of 3d point cloud-based on the sequence of images. (pp. 165–182). Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85152978043&partnerID=40&md5=f6dee6ef423beef3d3e4db8d838e2e1b>
- 3 **Das, S.,** Pratyush, P., Das, D., Maiti, J., & Krishna, O. (2022). Eye-tracking data as a way to detect sleep deprivation in an individual, based on attention, mental agility, and problem-solving. (pp. 195–208). Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85152978298&partnerID=40&md5=d89bc088c79840b763e2383c77c49613>
- 4 **Das, S.,** Prudhvi, K., & Maiti, J. (2022). Assessing mental workload using eye tracking technology and deep learning models. (pp. 3–12). [doi:10.1002/9781119792642.ch1](https://doi.org/10.1002/9781119792642.ch1)
- 5 **Das, S.,** Sarkar, A., Krishna, O., & Maiti, J. (2022). Iot-based laser trip wire system for safety and security in industries. In *Internet of things* (pp. 61–70). CRC Press.
- 6 **Das, S.,** Anwar, S., & Maiti, J. (2021). Saccadic scan path predicting using convolutional auto encoders. In *Internet of things* (pp. 85–99). CRC Press.
- 7 Dhalmahapatra, K., **Das, S.,** Kalbande, S., & Maiti, J. (2018). Virtual prototype based simulator for eot crane. In *Industrial safety management: 21st century perspectives of asia*. Springer Singapore.

Project and Teaching Assistance

Research and Consultancy Project

2023-2024

📌 **Enhancing Safety via Continuous Health Monitoring Using Breathable IoT Sensors, Vision, and Attention-based Graph Neural Networks through Predicting Workers' Remaining Productive Time, USA.**



Skill Used: Artificial Intelligence, Machine learning, Vision Analytic, Ergonomics

- Developing the AI framework for predicting safety and ergonomic risk.
- Modeling and Prediction of Workers' Remaining Productive Time



Project and Teaching Assistance (continued)

- 2022-2023
- **Development of a strategy to map between injury coding schemes used by QISU and OIICS, USA.**
Skill Used: Machine learning, Text mining, Large language models
 - Developing a strategy to map between injury coding schemes used by different injury surveillance agencies and generating a larger size dataset for training the ML models, thus improving the performance of those ML models in predicting injury code from incident narratives.
 - **Identifying Product Safety Concerns from Social Media Platform Using AI based Text Mining Approaches,** Consumer Product Safety Commission, USA.
Skill Used: Machine learning, Text mining, Large language models, Artificial intelligence
 - Developing a framework to capture product safety concerns from social media platforms such as twitter, amazon, etc.
- 2022-2023
- **Logistics and Process Safety Engineering (LPSE) for Officials of Adani Groups,** Adani Enterprises Limited, India.
Skill Used: Industrial safety engineering, Human factors and ergonomics, Industry 4.0, Metaverse technology, Risk assessment, Statistical and data analysis
 - Conducted educational sessions for plant officers on the fundamentals of industrial safety and assisted them in formulating strategic safety interventions to enhance the overarching safety management systems.
 - Led 26 diverse projects to enhance plant system understanding, identify process and machinery hazards, and formulate preventive safety measures.
- 2020-2023
- **Evaluation of human factors and safety in the submersible platform for acoustic characterization and evaluation for NPOL, DRDO, DRDO, Thrikkakara, Kochi, Kerala, India.**
Skill Used: Industrial safety engineering, Risk assessment, Virtual reality, Statistical and data analysis
 - Guided junior team members, enabling them in effectively carrying out their responsibilities within the project.
 - Involved in discussion with stakeholders to ensure the successful execution of the project.
 - **AI and virtual reality modelling and collaborative learning of risk and situational awareness in the socio-technical system under disruptions,** Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Govt. of India.
Skill Used: Machine learning, Text mining, Virtual reality, Human computer interaction, Situational Awareness, Statistical and data analysis
 - Guided junior team members, enabling them in effectively carrying out their responsibilities within the project.
 - Involved in discussion with stakeholders to ensure the successful execution of the project.
- 2021-2022
- **Evaluation of District Skill Development Planning (DSDP) awards,** Ministry of Skill Development and Entrepreneurship (MSDE), Government of India.
Skill Used: Policy analysis, Environmental impact analysis, Sustainability analysis, Cost-benefit analysis, Statistical and data analysis
 - Involved in evaluating districts based on the quality of their reports, their understanding, and the strategies proposed for district improvement.
 - Participated in the process of awarding districts based on their ideas, plans, and strategies.
- 2019-2021
- **Safety Excellence Journey in Aarti Steels,** Aarti Steels Limited, Cuttack, India.
Skill Used: Statistical and data analysis, Text mining, Virtual reality, Eye tracking technology
 - Facilitated educational workshops for plant officers, guiding them in comprehending industrial safety fundamentals and collaborating on strategic safety enhancements to strengthen overall safety management systems.
 - Executed the development of 100 diverse projects, supporting plants in gaining a more profound understanding of their systems.
- 2018-2019
- **Prevention through Design (PtD),** TATA Steels Limited, Jamshedpur, India.
Skill Used: Industrial safety engineering, Risk assessment, Industry 4.0, Statistical and data analysis
 - Conducted educational sessions for plant officers on the fundamentals of industrial safety and assisted them in formulating strategic safety interventions to enhance the overarching safety management systems.
 - Executed the development of 100 diverse projects, aiding plants in achieving a deeper comprehension of their systems and improving existing safety management systems.





Project and Teaching Assistance (continued)

- 2016-2022  **Safety Analytics: Save People at Work from Accidents and Injuries**, TATA Steels Limited, Jamshedpur, India.
Skill Used: Machine learning and artificial intelligence, Text mining, Industrial safety engineering, Virtual reality, Eye tracking technology, Statistical and Data Analysis
- Developed a virtual reality based training simulator for EOT crane operations.
 - Devised a robust methodology to assess mental workload of crane operators during operations.
 - Implemented cognitive workload monitoring and adaptive task management systems to proactively address human errors, enhance safety, and optimize operational costs.
- 2016-2018  **Hazard Identification, Risk Assessment and Risk Control for Ammunition Storage and Preparation in PXE Chandipur**, DRDO Chandipur, India.
Skill Used: Industrial safety engineering, Risk assessment, Statistical and data analysis
- Identified hazards and compiled a comprehensive list encompassing ammunition storage and related processes.
 - Devised a robust risk assessment methodology for quantifying risk of potential hazards.
 - Suggested strategic safety interventions to proactively prevent undesired events and mitigate the impact of incidents and accidents.

NPTEL course

- 2017-2020  Mooc course on **Design and Analysis of Experiment**
- 2018-2022  Mooc course on **Industrial Safety Engineering**
- 2019-2022  Mooc course on **Applied Multivariate Statistical Modeling**
- 2021-2022  Mooc course on **Safety and Risk Analytics**

Positions of Responsibilities

- 2017-2018  Member of Institute of Industrial and Systems Engineers (IISE) IISE Students Chapter-660, IIT Kharagpur.
- 2019-2020  Treasurer, IISE Students Chapter-660, IIT Kharagpur.
- 2018-2021  Member of the organizing committee of Doctoral Colloquium and Research Scholars' Day, Department of ISE, IIT Kharagpur.
- 2021-2022  Student Coordinator at ICMIAM, 2021 organized by University of Federation, Australia and Centre of Excellence in Safety Engineering and Analytics, IIT Kharagpur.