Novarun Deb, Ph.D.

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1. Basic Information

A. Employment History

Aug, 2024 onwards	**Assistant Professor (Tenure Track),** Department of Electrical and Software Engineering, University of Calgary, Alberta, Canada.
Dec, 2020 – Jul, 2024	**Assistant Professor Grade - II (Scaled Contract),** Indian Institute of Information Technology (IIIT), Vadodara, India.
Feb, 2020 – Dec, 2020	**Assistant Professor (On Contract - Consolidated Pay),** Indian Institute of Information Technology (IIIT), Vadodara, India.

B. Education

Aug, 2012 – Dec, 2018	**Ph.D., University of Calcutta, India.** Software Engineering Thesis title: *Enterprise Modelling and Requirements Analysis using the i* framework.*
Aug, 2010 – Jun, 2012	**M.Tech., University of Calcutta, India.** in Computer Science and Engineering. Thesis: *Intrusion Detection Systems for Wireless Ad-hoc Networks* Award: *Gold-medal winner*
Aug, 2008 – Jun, 2010	**M.Sc., University of Calcutta, India.** in Computer and Information Science. Thesis: *Intrusion Detection System for Wireless Mesh Networks* Award: *Gold-medal winner*
Jul, 2005 – Jun, 2008	**B.Sc. (Hons.), University of Calcutta, India.** in Computer Science. Thesis: *The OPIUM Compiler* Award: *Gold-medal winner*

C. Research Experience

Dec, 2018 – Jan, 2020	**Post-doctoral Researcher,** Ca' Foscari University, Venice, Italy.
Dec, 2017 – Nov, 2018	**Research Fellow,** Ca' Foscari University, Venice, Italy.

2. Scientific Qualifications

A. Invited Talks

March, 2019	**ACSS 2019:** *Compliance Checking of i* models.*
February, 2023	**SRM University, India:** *Frontiers in Requirements Engineering Research.*
March, 2023	**VNIT, India:** *Software for Cognitive Engineering.*

2. Scientific Qualifications (continued)

B. Review and Programme Committees

2024
- **32nd IEEE International Requirements Engineering Conference (RE'24):** *Artifact Evaluation Co-Chair.*
- **11th International Symposium on Applied Computing for Software and Smart systems (ACSS '24):** *PC Member.*

2023
- **10th International Symposium on Applied Computing for Software and Smart systems (ACSS '23):** *PC Member.*
- **Special Session on Privacy and Data Protection, 15th International Conference on Computational Collective Intelligence (ICCCI '23):** *PC Member.*

2022
- **30th IEEE International Requirements Engineering Conference (RE '22):** *PC Member (RE '22 Poster/Tool Demos).*
- **9th International Symposium on Applied Computing for Software and Smart systems (ACSS '22):** *PC Member.*

2021
- **8th Doctoral Symposium on Advanced Computing and Systems for Security (ACSS '21):** *PC Member.*

D. Research Funding and Projects

National
- *Safe Ship Navigation*
  Role: Co-Principal Investigator
  Funding Agency: Indian Space Research Organisation (ISRO)
  Research Grant: INR 11,42,920/-

E. Research Collaborations

Academia
- Collaboration with Prof. Agostino Cortesi, *Ca' Foscari University, Venice, Italy*, Prof. Nabendu Chaki, *University of Calcutta, India*, and Prof. Rituparna Chaki, *University of Calcutta, India*.
- Collaboration with Dr. Sajib Mistry, *Curtin University, Perth, Australia*.

Industry
- Collaboration with Dr. Nanjangud C. Narendra, *Ericsson Research, Bangalore, India*.

F. Collaboration Outcomes

UoW, Australia
- **Memorandum of Understanding** (MoU) with *University of Wollongong, NSW, Australia*. Took the initiative on behalf of *IIIT Vadodara, India*, and set up a channel with UoW, Australia. The MoU facilitates student, faculty, and research exchanges, joint activities, and collaborative project funding.
- **Facilitation of Joint-Degree Programs and Exchange Programs.** Person-in-charge of Curriculum Revision at IIIT Vadodara. Proposed changes in existing curriculum to facilitate the above programs. Currently, waiting for approval from Senate.

TCS-CoIN, India
- **Memorandum of Understanding** (MoU) with *Co-Innovation Network* wing of *TCS Corporate Research and Innovation* - also known as TCS CoIN. Took the initiative on behalf of *IIIT Vadodara, India* to set up a channel with TCS-CoIN. Enables TCS-CoIN and IIIT Vadodara to participate in joint research projects, faculty industrial training, and student industry internships.

3. Doctoral Training Qualifications

A. Ph.D. Supervision

Ongoing
- **Souvik Das**, *Univeristy of Calcutta, India*.
  Role: Joint Supervisor
  Degree Duration: 4-5 years
  Supervision Year: Fifth
  Supervision Work: Problem identification, State-of-the-Art analysis, Solution building, Monitoring experimental results and Publication of research articles.

- **Mandira Roy**, *Univeristy of Calcutta, India*.
  Role: Joint Supervisor
  Degree Duration: 4-5 years
  Supervision Year: Third
  Supervision Work: Problem identification, State-of-the-Art analysis, Solution building, Monitoring experimental results and Publication of research articles.

- **Pragati Kumari**, *IIIT Vadodara, India*.
  Role: Principal Supervisor
  Degree Duration: 4-5 years
  Supervision Year: Second
  Supervision Work: Coursework and self-study course on Applications of Category Theory

Completed
- *None.*

Evaluation Experience
- *None.*

4. Pedagogical Studies and Development

A. Industrial Training and Certification

Intellipaat and IIT Guwahati
- **Azure Administrator**.
  Trained in VMs, VM Images, VM Scalesets, VM Availability Sets, Azure Storage Accounts, Azure File Storage and Sync, Autoscaling and Load Balancing, Azure App Services, Azure Container Registries, VNets, Vnet Peering, Azure DNS, Azure Application Gateway, Azure Traffic Manager.

- **DevOps CI/CD Pipelines**.
  Trained in Git (for version control management), Jenkins (for continuous integration), Docker (for containerization), Kubernetes (for container orchestration), Ansible (for configuration management), Terraform (for deploying infrastructures as code), and the ELK Stack and Nagios (for monitoring the operations environment).

- **Amazon AWS Solutions Architect**.
  Trained in EC2, EBS, EFS, Autoscaling and Elastic Load Balancers, Route 53, Virtual Private Clouds, S3, RDS, IAM and Cloudwatch, and the basics of AWS Lambda.

4. Pedagogical Studies and Development (continued)

B. Pedagogical Training

Workshops Attended

- ▌ **Future-Proof Your Teaching Skills: Learning Series**, *Prof. Pankaj Jalote, IIIT Delhi, India*. Duration: 06-16 October, 2020.
- ▌ **The Need to Shift from Pedagogy to Andragogy and Heutagogy**, *Prof. Mangala Sunder Krishnan, IIT Madras, India*. Duration: 01 July, 2021.

C. Courses Taught

Cloud Solution Architectures

- ▌ **Autumn 2023 Semester, IIIT Vadodara, India**.
  - 3-credit course with 180 students (approx.) - Floated as an elective course for B.Tech. program 7th semester.

The Principles of DevOps

- ▌ **Autumn 2022 Semester, IIIT Vadodara, India**.
  - 4-credit course with 8 students. - Floated as an elective course for M.Tech. program.
- ▌ **Winter 2023 Semester, IIIT Vadodara, India**.
  - 2-credit course with 150+ students. - Floated as an elective course for B.Tech. program.

Software Engineering

- ▌ **Autumn 2020 Semester, IIIT Vadodara, India**.
  - 5-credit course with 165 students.
- ▌ **Autumn 2021 Semester, IIIT Vadodara, India**.
  - 5-credit course with 216 students.
- ▌ **Autumn 2022 Semester, IIIT Vadodara, India**.
  - 5-credit course with 311 students.
- ▌ **Autumn 2023 Semester, IIIT Vadodara, India**.
  - 5-credit course with 294 students.
- ▌ **Winter 2024 Semester, IIIT Vadodara, India**.
  - 5-credit course with 300 students (approx.).

Software Project Management

- ▌ **Winter 2021 Semester, IIIT Vadodara, India**.
  - 5-credit course with 26 students.
- ▌ **Winter 2022 Semester, IIIT Vadodara, India**.
  - 5-credit course with 36 students.
- ▌ **Winter 2023 Semester, IIIT Vadodara, India**.
  - 5-credit course with 40 students.
- ▌ **Winter 2024 Semester, IIIT Vadodara, India**.
  - 5-credit course with 36 students.

Database Management Systems

- ▌ **Winter 2022 Semester, IIIT Vadodara, India**.
  - 5-credit course with 150 students.

Data Structures

- ▌ **Winter 2020 Semester, IIIT Vadodara, India**.
  - 5 credits course with 220 students.

4. Pedagogical Studies and Development (continued)

Object Oriented Programming and Design	🔖 **Autumn 2020 Semester, IIIT Vadodara, India**. - 5-credit course with 217 students.

D. Teaching Materials

YouTube Channel	🔖 **Online Recorded Lectures**. 1. `https://youtu.be/DnVEAZLQ7r0`: Sample lecture video of a case study to demonstrate interdependence of Software Dependability requirements. 2. `https://youtu.be/SELwk0cLLrM`: Sample lecture video on introduction to Software Testing.
LMS Platforms	🔖 **Moodle, Google Classroom**. Managed all courses in remote and online (post Covid) mode through these platforms.
Questions	🔖 **Google Meet Polls, Moodle**. Extensive question banks created by conducting polls during theory lectures. Questions separately created for conducting online quizzes on Moodle.

E. Teaching Experience

Techniques Used	🔖 **Think Aloud Pair Problem Solving (TAPPS)**
	🔖 **Bookend Lectures**
	🔖 **Minute Papers**
	🔖 **Peer Learning and Assessment**
	🔖 **Flipped Classroom** *(For Data Structure and Software Engineering.)*
	🔖 **Ethical Learning**

F. Course and Programme Development

Programme Development	🔖 **National Education Policy (NEP) 2020**, *Government of India*. - Member of Task Force for the deployment of NEP 2020 at IIIT Vadodara.
	🔖 **UG Curriculum Design and Review**, *IIIT Vadodara, India*. - Person-In-Charge for the UG Curriculum Revision of IIIT Vadodara for the year 2022.
Course Development	🔖 **Agile and DevOps**. - Prerequisite: *Introduction to Software Engineering* - Semester offered: *6th or 7th (in a 4-year B. Tech. Programme)* - Credit Structure (L-T-P:C): *3-0-2:4*
	🔖 **Cloud Solution Architectures (Amazon AWS, Google Cloud, MS Azure)**. - Prerequisite: *Introduction to Cloud Computing* - Semester offered: *7th (in a 4-year B. Tech. Programme)* - Credit Structure (L-T-P:C): *2-0-3:4*

4. Pedagogical Studies and Development (continued)

🔖 **Data Management on Clouds (Azure Data Factory, AWS Big Data)**.
- Prerequisite: *Introduction to Cloud Computing, Introduction to Database Management Systems*
- Semester offered: *7th or 8th (in a 4-year B. Tech. Programme)*
- Credit Structure (L-T-P:C): *2-0-3:4*

Vocational Training 🔖 **DevOps CI/CD Pipelines**.
- Level: *Intermediate*
- Duration: *1.5 - 2 months*

🔖 **Amazon AWS: Solution Architectures and Big Data Management**.
- Level: *Intermediate*
- Duration: *1.5 - 2 months*

🔖 **Microsoft Azure: Solution Architectures and Administration**.
- Level: *Beginner*
- Duration: *1 month*
After completion of industrial training and certification.

🔖 **Microsoft Azure: Data Factory and Security**.
- Level: *Beginner*
- Duration: *1 months*
After completion of industrial training and certification.

5. Skills

Languages 🔖 Strong reading, writing and speaking competencies for English, Hindi, Bengali.

🔖 Intermediate reading, writing and speaking competencies for Italian.

Coding 🔖 C, C++, Java, Shell Script, PHP, Python, SQL, XML/XSL, LaTeX.

Tool Frameworks 🔖 Git, Jenkins, Selenium, Docker, Kubernetes, Ansible, Terraform, Elk Stack and Nagios, RE-Tools, jUCMNav, Visual Paradigm, Archi, NuSMV, Visual Studio.

Tools Built 🔖 i*ToNuSMV (RE'16), CARGo (RE'19), SLC (EDCC'20), RV-SLC (RE'21), CARO (RE'21).

6. References

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School of EECMS, Curtin University
Perth, Australia.
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Patent and Publications

Patents

1. Pal, R. K., Chakraborty, A., & **Deb**, **N.** (2017). *"K-ary tree to Binary Tree Conversion through Complete Height Balanced Technique"*. US Patent Number: 9715514.

Journal Articles (with Peer Review)

1. Das, S., **Deb**, **N.**, Chaki, N., & Cortesi, A. (2024). "Extracting Goal Models from Natural Language Requirement Specifications". *Journal of Systems and Software, Elsevier, 211*.
   🔗 doi:10.1016/J.JSS.2024.111981

2. Roy, M., Bag, R., **Deb**, **N.**, Cortesi, A., Chaki, R., & Chaki, N. (2024). "SCARS: Suturing wounds due to conflicts between non-functional requirements in autonomous and robotic systems". *Software - Practice and Experience, Wiley, 54(5)*, 759–795. 🔗 doi:10.1002/SPE.3297

3. Das, S., **Deb**, **N.**, Chaki, N., & Cortesi, A. (2023). "Minimising Conflicts among Run-time Non-Functional Requirements within DevOps". *Systems Engineering, Wiley*.
   🔗 doi:https://doi.org/10.1002/sys.21715

4. Das, S., **Deb**, **N.**, Cortesi, A., & Chaki, N. (2023b). "Driving the Technology Value Stream by Analyzing App Reviews". *IEEE Transactions on Software Engineering, 49 (7)*, 3753–3770.
   🔗 doi:10.1109/TSE.2023.3270708

5. Khurana, S., **Deb**, **N.**, Mistry, S., Ghose, A., Krishna, A., & Dam, H. (2023). "Egalitarian Transient Service Composition in Crowdsourced IoT Environment". *IEEE Transactions on Services Computing*, 1–14.
   🔗 doi:https://doi.org/10.1109/TSC.2023.3264581

6. Roy, M., Das, S., **Deb**, **N.**, Cortesi, A., Chaki, R., & Chaki, N. (2023). "Correlating Contexts and NFR Conflicts from Event Logs". *Software and Systems Modelling, Springer*.
   🔗 doi:https://doi.org/10.1007/s10270-023-01087-4

7. Das, S., **Deb**, **N.**, Cortesi, A., & Chaki, N. (2021). "Sentence Embedding Models for Similarity Detection of Software Requirements". *Springer Nature Computer Science, 2 (69)*.
   🔗 doi:10.1007/s42979-020-00427-1

8. Roy, M., **Deb**, **N.**, Cortesi, A., Chaki, R., & Chaki, N. (2021c). "NFR-aware Prioritization of Software Requirements". *Systems Engineering, Wiley*, 1–19. 🔗 doi:10.1002/sys.21572

9. Roy, M., **Deb**, **N.**, Cortesi, A., Chaki, R., & Chaki, N. (2021d). "Requirement-oriented Risk Management for Incremental Software Development". *Innovations in Systems and Software Engineering, Springer, 17*, 187–204. 🔗 doi:10.1007/s11334-021-00406-6

10. Narendra, N. C., **Deb**, **N.**, & Das, S. (2020). "Dynamic Contextual Goal Management in IoT-based Systems". *IEEE Internet of Things Journal, 7 (10)*, 10708–10718. 🔗 doi:10.1109/JIOT.2020.3013643

11. **Deb**, **N.**, Chaki, N., & Ghose, A. (2016a). "Extracting Finite State Models from i* models". *Journal of Systems and Software (JSS), Elsevier, 121*, 265–280. 🔗 doi:10.1016/j.jss.2016.03.038

12. **Deb**, **N.**, Chakraborty, M., & Chaki, N. (2014d). "CORIDS: A Cluster-Oriented Reward-based Intrusion Detection System for Wireless Mesh Networks". *Security and Communication Networks (SCN), Wiley, 7 (3)*, 532–543. 🔗 doi:10.1002/sec.750

Conference Articles (with Peer Review)

1. Das, S., **Deb**, **N.**, Cortesi, A., & Chaki, N. (2023c). "Zero-shot Learning for Named Entity Recognition in Software Specification Documents". In *IEEE International Requirements Engineering Conference (RE'23), Hannover, Germany*. 🔗 doi:https://doi.org/10.1109/RE57278.2023.00019

2 Gaur, K., Sodani, R. R., Dobriyal, A., Pillai, A. M., Khurana, S., **Deb**, **N.**, … Ghose, A. K. (2022). "An Optimization Ontology for Goal Modelling Frameworks". In *Lecture Notes in Business Information Processing (LNBIP), Enterprise Design, Operations, and Computing (EDOC '22)*. doi:https://doi.org/10.1007/978-3-031-26886-1_6

3 Ambade, P., Solanki, D., & **Deb**, **N.** (2021). "RV-SLC: A Tool for Regression Validation of Safety and Liveness Constraints on Goal Models in DevOps Environment". In *29th IEEE International Requirements Engineering Conference, (RE'21)*. doi:10.1109/RE51729.2021.00066

4 Roy, M., **Deb**, **N.**, Cortesi, A., Chaki, R., & Chaki, N. (2021a). "CARO: A Conflict Aware Requirement Ordering Tool for DevOps". In *29th IEEE International Requirements Engineering Conference, (RE'21)*. doi:10.1109/RE51729.2021.00061

5 **Deb**, **N.**, Roy, M., Chaki, N., & Cortesi, A. (2020). "Generation of Safety and Liveness Compliant Automata from Goal Model Specifications". In *16th European Dependable Computing Conference, (EDCC 2020)*. doi:10.1109/EDCC51268.2020.00029

6 **Deb**, **N.**, Mallik, M., Roychowdhury, A., & Chaki, N. (2019). "CARGo: A prototype for Contextual Annotation and Reconciliation of Goal Models". In *27th IEEE International Requirements Engineering Conference, (RE 2019)* (pp. 486–489). doi:10.1109/RE.2019.00068

7 Samanta, R., Kumari, C., **Deb**, **N.**, Bose, S., Cortesi, A., & Chaki, N. (2018). "Node Localization for Indoor Tracking using Artificial Neural Network". In *3rd International Conference on Fog and Mobile Edge Computing, (FMEC 2018)* (pp. 229–233). doi:10.1109/FMEC.2018.8364071

8 Chakraborty, M., **Deb**, **N.**, & Chaki, N. (2017). "POMSec: Pseudo-Opportunistic, Multipath Secured Routing Protocol for Communications in Smart Grid". In *16th International Conference on Computer Information Systems and Industrial Management, (CISIM 2017)* (pp. 264–276). doi:10.1007/978-3-319-59105-6_23

9 Santiputri, M., **Deb**, **N.**, Ghose, A., Dam, H. K., Chaki, N., & Khan, M. A. (2017). "Mining Goal Refinement Patterns: Distilling Know-how from Data". In *36th International Conference on Conceptual Modeling, (ER 2017)* (pp. 69–76). doi:10.1007/978-3-319-69904-2_6

10 **Deb**, **N.**, Chaki, N., & Ghose, A. (2016b). "i*ToNuSMV: A Prototype for Enabling Model Checking of i* Models". In *24th IEEE International Requirements Engineering Conference, (RE 2016)* (pp. 397–398). doi:10.1109/RE.2016.62

11 **Deb**, **N.**, & Chaki, N. (2014). "Verification of i* Models for Existential Compliance Rules in Remote Healthcare Systems". In *Applications and Innovations in Mobile Computing, (AIMoC 2015)* (pp. 60–66). doi:10.1109/AIMOC.2014.6785520

12 **Deb**, **N.**, & Chaki, N. (2012). "TIDS: A Trust based Intrusion Detection System for Wireless Ad-hoc Networks". In *11th International Conference on Computer Information Systems and Industrial Management, (CISIM 2012)* (pp. 80–91). doi:10.1007/978-3-642-33260-9_6

13 **Deb**, **N.**, Chakraborty, M., & Chaki, N. (2011). "A State-of-the-art Survey on IDS for Mobile Ad-Hoc Networks and Wireless Mesh Networks". In *1st International Conference on Parallel, Distributed Computing Technologies and Applications, (PDCTA 2011)* (pp. 169–179). doi:10.1007/978-3-642-24037-9_17

Workshop Articles (with Peer Review)

1 **Deb**, **N.**, Chaki, N., & Ghose, A. (2015). *"Using i* Model towards Ontology Integration and Completeness Checking in Enterprise Systems Requirement Hierarchy"*. doi:10.1109/MoDRE.2015.7343871

Monographs

1 **Deb**, **N.**, & Chaki, N. (2019). *"Business Standard Compliance and Requirements Validation Using Goal Models"* (A. Cortesi & N. Chaki, Eds.). doi:10.1007/978-981-15-2501-8

Articles in Anthologies

1. Das, S., **Deb, N.,** Cortesi, A., & Chaki, N. (2023a). "CoDescribe: An Intelligent Code Analyst for Enhancing Productivity and Software Quality". (Accepted 15 April, 2023). 10th International Symposium on Applied Computing for Software and Smart Systems (ACSS-2023).

2. Dave, D., Khandelwal, A., Pandey, I., & **Deb, N.** (2023). "Blockchain Based Journal Review System". (Accepted 15 April, 2023). 10th International Symposium on Applied Computing for Software and Smart Systems (ACSS-2023).

3. Soni, A., Chouhan, D., Mahalwar, H., Kakad, A., & **Deb, N.** (2023). "Xify: GAN-based Classifier for Covid-19 and Pneumonia X-Ray Image". (Accepted 15 April, 2023). 10th International Symposium on Applied Computing for Software and Smart Systems (ACSS-2023).

4. Roy, M., **Deb, N.,** Cortesi, A., Chaki, R., & Chaki, N. (2021b). "Dynamic Prioritization of Software Requirements for Incremental Software Development". In R. Chaki, N. Chaki, A. Cortesi, & K. Saeed (Eds.), *Advanced Computing and Systems for Security: Volume 14* (pp. 111–131). doi:10.1007/978-981-16-4294-4_8

5. **Deb, N.,** Chaki, N., Roy, M., Pal, S., & Bhaumick, A. (2020). "Extracting Business Compliant Finite State Models from i* Models". In R. Chaki, A. Cortesi, K. Saeed, & N. Chaki (Eds.), *Advanced Computing and Systems for Security: Volume 9* (pp. 39–52). doi:10.1007/978-981-13-8962-7_4

6. **Deb, N.,** Roy, M., Pal, S., Bhaumick, A., & Chaki, N. (2020). "A Deployment Framework for Ensuring Business Compliance Using Goal Models". In M. L. Gavrilova, C. J. K. Tan, K. Saeed, & N. Chaki (Eds.), *Transactions on Computational Science XXXV* (pp. 106–118). Berlin, Heidelberg: Springer Berlin Heidelberg.

7. Chakraborty, M., **Deb, N.,** Roy, D. B., & Chaki, R. (2014). "Chapter 2: Architecture and Organization Issues". In R. Chaki & N. Chaki (Eds.), *Intrusion Detection in Wireless Ad-Hoc Networks, 1st Edition* (pp. 43–72). CRC Press, Taylor and Francis Group.

8. **Deb, N.,** Chakraborty, M., & Chaki, N. (2014a). "Chapter 1: Introduction". In R. Chaki & N. Chaki (Eds.), *Intrusion Detection in Wireless Ad-Hoc Networks, 1st Edition* (pp. 1–42). CRC Press, Taylor and Francis Group.

9. **Deb, N.,** Chakraborty, M., & Chaki, N. (2014b). "Chapter 5: Honesty and Trust-Based IDS Solutions". In R. Chaki & N. Chaki (Eds.), *Intrusion Detection in Wireless Ad-Hoc Networks, 1st E]dition* (pp. 111–146). CRC Press, Taylor and Francis Group.

10. **Deb, N.,** Chakraborty, M., & Chaki, N. (2014c). "Chapter 7: Intrusion Detection for Wireless Mesh Networks". In R. Chaki & N. Chaki (Eds.), *Intrusion Detection in Wireless Ad-Hoc Networks, 1st Edition* (pp. 171–200). CRC Press, Taylor and Francis Group.