

Dr. Mahinsasa Rathnayake

B.Sc. Eng. (Hons), MSc., PhD, AMIESL, MECSL, LCA Researcher & Trainer

Full Name: Hewawasan Haggallage Mahinsasa Prabhachandra Rathnayake

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Gender: Male

Nationality: Sri Lankan

Civil Status: Married



Professional Experience

Senior Lecturer at Dept. of Chemical and Process Engineering, University of Moratuwa, Sri Lanka.

April, 2019 – Present (06 Years and 02 Months)

- Lecturing for Chemical & Process Engineering Undergraduate Courses: Process Equipment Design, Sustainable Process Technology, Research Project, Comprehensive Design Project, and Waste Minimization & Resources Recovery.
- Instructing the Process Modeling & Simulation Tools, such as ASPEN PLUS, etc. and Mechanical Design Tools, such as SolidEdge, etc. for Chemical & Process Engineering Undergraduates in their Final Year Design Projects.
- The Course Coordinator – Master of Science/Post Graduate Diploma in Sustainable Process Engineering Course
- Coordinator & Resource Person for Training programs on Life Cycle Assessment, Carbon Footprint Assessment, and Water Footprint Assessment.
- In-Charge of Computer-Aided Process Development Center and LCA Research Center at the Department.
- The Coordinator – Department Industrial Training coordination for undergraduate internships.
- The Coordinator – Department Industrial Consultative Board (DICB) Meeting
- Former Editor of Faculty of Engineering Research Unit (ERU) and Publication Chair for Annual Research Conference (MERCon) organized by the Faculty of Engineering Research Unit (ERU).

Lecturer (Probationary) at Dept. of Chemical and Process Engineering, University of Moratuwa, Sri Lanka.

May, 2013 – April, 2019 (6 years)

- Lecturing for Chemical & Process Engineering Undergraduate Courses: Plant and Equipment Design, Computer-aided Chemical engineering, Energy Efficiency & Conservation, Mechanical Science.

Lecturer (Contract) at Dept. of Mechanical and Manufacturing Engineering, University of Ruhuna, Sri Lanka.

February 2013 - May 2013 (3 months)

- Lecturing for Mechanical & Manufacturing Engineering Undergraduate Courses: Computer-aided manufacturing, Theory of machines, and Maintenance management. The temporary academic sub warden.

Production Manager at Swadeshi Industrial Works PLC, Kandana, Sri Lanka

September, 2010 – February, 2013 (2 years 6 months)

- Senior management position of the company that is solely responsible for all the production operations in the personal care products factory directly reporting to the Chief Executive Officer.
- Preparation of an incentive scheme for labor productivity improvement in the factory.
- Implementation of 5S system/kaizens for productivity & process efficiency improvement in the personal care products factory.
- Production planning including raw material planning and operations management for the factory.
- Design and installation of in-house distilled water manufacturing plant for plant capacity enhancement of the personal care products factory.
- Installation & commissioning of new equipment: Vertical Pressure Leaf Filter, Carton Machine, Talc Sterilizer, etc.
- Steam and electricity saving projects and rearrangement of fire safety program, including installation of a fire alarm system and fire extinguisher points/assembly points/fire drills for the factory site.

Visiting Lecturer Positions & Invited/Guest speeches

MSc in Sustainable Process Engineering, University of Moratuwa, Sri Lanka

- Lecturer for modules: Sustainable Process Development Techniques, Sustainable Process Design

MSc in Industrial Organic Chemistry, University of Sri-Jayewardenepura, Sri Lanka

- Lecturer for course module: Basics and Principles of Industrial Organic Chemistry and Chemical Engineering

MSc in Polymer Science and Technology, University of Sri-Jayewardenepura, Sri Lanka

- Lecturer for course module: Cleaner Production & Sustainability Management

Dept. of Industrial Chemistry, University of Sri-Jayewardenepura, Sri Lanka

- Visiting lecturer for the final year module: Fundamentals of Process Engineering

Dept. of Polymer Science, University of Sri-Jayewardenepura, Sri Lanka

- Visiting lecturer for the final year module: Life Cycle Analysis for Polymer Products and Processes

Dept. of Biosystems Technology, Faculty of Technology, Sabaragamuwa University of Sri Lanka (SUSL)

- Visiting lecturer for the bioenergy specialization module: Supply chains for biomass and bioenergy

College of Chemical Sciences, Ceylon Institute of Chemistry, Sri Lanka

- Visiting lecturer for the final year course, Fundamentals of chemical process engineering

First National Life Cycle Assessment Conference organized by National Cleaner Production Center, SL

- Guest speech on "Importance of life cycle data and national life cycle database development"

Annual Packaging Congress organized by Sri Lanka packaging Institute in Year 2021, 2022, 2024

- Guest speech on "Life cycle assessment tools and importance for the packaging industry"

International research Conference of SLTC 2022, organized by SLTC Research University

- Invited Speaker for Pre-Conference Webinar on "Sustainable Biofuels in Circular Economy"

Skill-Up & Standout Workshop organized by the IEEE Young Professionals Association, Sri Lanka

- Guest speech on "True Blue Strategy (Professional Ethics)"

Industrial Seminar on Waste 2 Wealth: Navigating Plastics Circularity, Unveiling Sustainability, & Recycling at BMICH organized by SDD Polymer Pvt Ltd, Sri Lanka

- Invited Speaker on "Life cycle assessment for the packaging industry and packaging options"

Webinar on "Industrial Practices for Sustainable Future" organized by the Aqua Nature Club, Aqua Trading Global Pvt Ltd, Sri Lanka

- Guest speech on "Industrial Practices for Sustainable Future"

EPR Symposium 2024 organized by Ceylon Chamber of Commerce and Biodiversity Sri Lanka

- Keynote speech on "Life cycle assessment for Extended Producer Responsibility"

Resource Person for Training Programs

Training Program on "Wastewater & Sludge Treatment, Waste Valorization and Life Cycle Assessment" for Industry Participants, held at University of Moratuwa, Sri Lanka in 2023

- Resource Person for Life Cycle Assessment Module in the Training Program

Training Program on "Carbon Footprint Assessment for Sustainable Process Industry" for Industry Participants held at University of Moratuwa, Sri Lanka in 2023

- Resource Person for conducting the entire Training Program

Training Program on "Water Footprint Assessment for Sustainable Process Industry" for Industry Participants held at University of Moratuwa, Sri Lanka in 2024

- Resource Person for conducting the entire Training Program

Training Program on "Science-Based Target Initiative (SBTi)" for Industry Participants organized by SGS Sri Lanka in 2024

- Resource Person for conducting the entire Training Program

Training Program on "Product Carbon Footprint Assessment" for Industry Participants organized by SGS Sri Lanka in 2024

- Resource Person for conducting the entire Training Program

Educational Qualifications

Doctoral Degree (PhD)

Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand

January, 2016 – April, 2019

Ph.D. Dissertation: Life cycle assessment of bioethanol production and solid sorbents for airborne pollution control processes

Specialized post-graduate research areas: Life Cycle Assessment (LCA), Biofuels, Airborne Pollution Control, Process Simulation, Solid Waste Recovery

Master Degree (MSc)

Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand

August, 2014 – December 2015

MSc Thesis: Process simulation for CO₂ and SO₂ capture using Coal Fly Ash as solid sorbent

Overall GPA: 4.00/4.00

Bachelor Degree (BSc.Eng (Hons))

Dept. of Mechanical & Manufacturing Engineering, Faculty of Engineering, University of Ruhuna, Sri Lanka

September, 2006 – August, 2010

Final year Research Project: Development of a biomass gasifier unit for household cooking purposes

Overall GPA: 3.36/4.00 with Second class upper honors

Professional Training

Training and Capacity Building (TCB) Cell, Quality Council of India

- Assessor Training on Principles and requirements of ISO/IEC 17029:2019 for validation and verification bodies'

University of Kelaniya, Sri Lanka – University Teacher Training Unit

- Six (06) Months Induction Training on Teaching in Universities and Higher Educational Institutes

Institution of Engineers, Sri Lanka (IESL)

- Special Training (02 Days) on Outcome Based Education (OBE) for Engineering Education

Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand

- Special Training (06 Months) on research journal editing and technical rewriting

Honors and Awards

- Outstanding Research Performance Award of University of Moratuwa in years 2020, 2021, & 2022.
- Best Research Paper award at International Forestry and Environment Symposium 2019, Sri Lanka.
- Best Research Paper award at Vidulka National Energy Symposium 2013, Sri Lanka.

Research Interests & Expertise

- Life Cycle Assessment
- Carbon Footprint Assessment & Water Footprint Assessment
- Circularity Assessment & Circular Economy
- Environmental Sustainability
- Environmental Social Governance (ESG)
- Carbon Capture and Airborne Pollution Control
- Bioenergy & Biofuels
- Waste Minimization & Waste Valorization

Industrial Projects and Consultancies Involved

- Trainer/ Consultant/Technical Expert on Life Cycle Assessment, SBTi, Product Carbon Footprint Assessment, Water Footprint Assessment, Circularity Assessment, and ESG.
- Improvement of Softseal dyeing process: September 2021 – July 2023
- EUSL - TESS project (Techno-economic Societal Sustainable Development Training in Sri Lanka), which is co-funded by the European Union under the auspices of Erasmus+ Capacity Building in Higher Education Programme & Europe - Sri Lanka Capacity Building in Energy Circular Economy (EUSL waste) Project is funded by Erasmus+ Capacity Building in the field of higher education: January 2022 – December 2024
- Consultant for New Laboratory Development, Faculty of Computing and Technology – University of Kelaniya: January 2022 – July 2022
- Europe Sri Lanka Capacity Building in Energy Circular Economy - "EUSL-Energy", a project, in a unique, not yet explored, way, address the challenge, and turn this into an opportunity, of creating an excellent educational program within the energy transition sector, so far not existing in the targeted emerging economic country (Sri Lanka): January 2020 – December 2021
- Feasibility Assessment of Waste Plastic Pyrolysis Technologies for Sri Lanka – A project for Waste Management Authority, Western Province: June 2021 – September 2021
- Environmental impact assessment (EIA) for the proposed Embilipitiya paper mill
December 2019 – January 2020
- European Union (EU) funded project for "Development of National LCA Database Roadmaps"
Consultant for National Cleaner Production Center, Sri Lanka (NCPC-SL)(January 2019 - August 2019)
This project on the Development of National LCA Database Roadmaps was assisted by UN Environment Program (UNEP) through the Life Cycle Initiative and funded by the European Commission. Running by National Cleaner Production Centre, Sri Lanka (NCPC-SL), the project was led by the ecoinvent Association in Switzerland with the aim to support the development of a national LCA database roadmap for Sri Lanka, as well as to advance on LCA data availability in the country and their interoperability.
- Installation and commissioning a vertical pressure leaf filter with a 50 m height structure
Project Leader at Swadeshi Industrial Works PLC, Kandana, Sri Lanka (September 2010 - July 2011)
Vertical Pressure Leaf Filter (VPLF) is a large-scale Filter Press, which is used in Oil Bleaching and Refinery to filter the bleached oil. Project included the supervision of the entire filter plant (60 m³ capacity) from the foundation of a 50 m height structure to the complete installation of the machine and the commissioning work to add the machine into normal production operation.
- Installation and commissioning of a carton machine for soap tablets wrapping
Project team member at Swadeshi Industrial Works PLC, Kandana, Sri Lanka (March 2011 - May 2011)
This project involved in the installation to commissioning work in order to take the carton machine into proper production operation by replacing manual operations conducted for soap wrapping, previously.
- Enhancement of production capacity of distilled water production for personal care products manufacturing
Project Leader at Swadeshi Industrial Works PLC, Kandana, Sri Lanka
September 2011 - December 2011
Distilled Water is required for manufacturing Personal Care products such as Lotions, Shampoo, face wash, etc. Project work included designing a high-capacity Distilled Water manufacturing plant and supervision of the fabrication and installation work. This new plant enhanced the production capacity & productivity of the factory.

National Contribution

- Member of the Steering Committee for AFD - Agence Française de Développement-funded project on air quality management in Sri Lanka, Coordinated by the Ministry of Environment.
- Member of the Technical Evaluation Committee for Repairs to Petrol Loading Tank No. Tk-31 And Tk-32 at, Muthurajawela Terminal, Ceylon Petroleum Storage Terminals Limited.
- Member of Evaluation Panel for Accreditation Assessment of Bachelor of Engineering Technology Honours Degree Programme in Energy and Environmental Technology of the University of Sri Jayewardenepura, Sri Lanka – Appointed by the Accreditation Division, The Institution of Engineers, Sri Lanka.

Professional Memberships & Involvements

- Practitioner, Independent Consultant, Reviewer, and Trainer in Sustainability Assessments
 - Reviewer of the Journal of Cleaner Production
 - Reviewer of the Journal of Biomass Conversion and Biorefinery
 - Reviewer of the International Journal of Chemical Engineering
 - Reviewer of the Journal of Clean Technologies and Environmental Policy
 - Associate Member of the Institution of Engineers, Sri Lanka (AMIESL)
 - Member of the Engineering Council, Sri Lanka (MECSL)
 - Member of Young Scientists Forum (YSF) of National Science & Technology Commission (NASTEC)
 - Registered Scientist of the National Science Foundation (NSF)
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Selected Research Publications

Journal Articles

- Gayashani W and **Rathnayake M***. Comparative life cycle assessment of waste polyethylene utilization for polymer-modified asphalt and pyrolysis oil production. Journal of Waste Management & Research. (2025). <https://doi.org/10.1177/0734242X251340340>
- Faroque, F.A., Jayasundara, P.M., **Rathnayake, M.** et al. Life cycle assessment of bio-based and synthetic epoxy resin mediated composite tiles: a comparative analysis based on agricultural and industrial waste filler. Journal of Material Cycles & Waste Management. (2025). <https://doi.org/10.1007/s10163-025-02260-1>
- Abeyesuriya, D.I., Sethunga, G.S.M.D.P. & **Rathnayake, M.*** Process simulation-based scenario analysis of scaled-up bioethanol production from water hyacinth. Biomass Conversion and Biorefinery. (2024). <https://doi.org/10.1007/s13399-023-03891-w>
- Jayasekara, T., Wickrama Surendra, Y. & **Rathnayake, M.*** Polylactic Acid Pellets Production from Corn and Sugarcane Molasses: Process Simulation for Scaled-Up Processing and Comparative Life Cycle Analysis. Journal of Polymers and the Environment. 30, 4590–4604 (2022). <https://doi.org/10.1007/s10924-022-02535-w>
- Dilshani, A., Wijayananda, A. and **Rathnayake, M.*** Life cycle net energy and global warming impact assessment for hydrogen production via decomposition of ammonia recovered from source-separated human urine. International Journal of Hydrogen Energy (2022). <https://doi.org/10.1016/j.ijhydene.2022.05.188>
- Jayasundara, P.M., Jayasinghe, T.K. & **Rathnayake, M.*** Process Simulation Integrated Life Cycle Net Energy Analysis and GHG Assessment of Fuel-Grade Bioethanol Production from Unutilized Rice Straw. Waste Biomass Valorization (2022). <https://doi.org/10.1007/s12649-022-01763-4>
- Wanninayake, P., **Rathnayake, M.**, Thushara, D. & Gunawardena, S.* Conversion of rice straw into 5-hydroxymethylfurfural: review and comparative process evaluation. Biomass Conv. Biorefinery. 12, 1013–1047 (2022). <https://doi.org/10.1007/s13399-021-01351-x>
- **Rathnayake, M.**, Julnipitawong, P., Tangtermsirikul, S. and Toochinda, P.* Utilization of coal fly ash and bottom ash as solid sorbents for sulfur dioxide reduction from coal fired power plant: Life cycle assessment and applications. Journal of Cleaner Production, 202, pp. 934-945 (2018). <https://doi.org/10.1016/j.jclepro.2018.08.204>
- **Rathnayake, M.**, Chaireongsirikul, T., Svangariyaskul, A., Lawtrakul, L. and Toochinda, P.* Process simulation-based life cycle assessment for bioethanol production from cassava, cane molasses, and rice straw. Journal of Cleaner Production, 190, pp.24-35 (2018). <https://doi.org/10.1016/j.jclepro.2018.04.152>

Book Chapters

- S Dassanayake, U Perera, **M Rathnayake**, Unleashing Potential: Transcending Marine Pollution Forecasts for a Better Future and Critical Thresholds in Coastal and Marine Pollution: Source to Sink, Mitigation and Management, pp. 425-446
- A. Sanduni Kavindi and B. Mahinsasa Rathnayake, Overview of biodiesel production processes in Developments in Biodiesel Feedstock, Production, and Properties, ed. R. G. Balakrishna, S. Mohan, and T. Zaki Sharara, Royal Society of Chemistry, 2024, vol. 84, ch. 7, pp. 141-169. <https://doi.org/10.1039/9781837672530>
- Jayasundara, P.M. and **Rathnayake, M.***, 2023. Environmental impacts and sustainability assessment of fruit and vegetable waste valorization through life cycle assessment (includes an overview of life cycle assessment from laboratory scale to industrial implementations and social & economic sustainability). Fruit and Vegetable Waste Utilization and Sustainability, pp.181-212. <https://doi.org/10.1016/B978-0-323-91743-8.00010-1>

Conference Proceedings

- T Bandara, D Wickramanayake, **M Rathnayake**, V Rakocevic., Identification of Environmental Impacts from Copper Usage in Solar and Offshore Wind Energy Systems, 6th International Conference on Energy and Environment: bringing together Engineering and Economics, Guimarães, Portugal, 6-7 June, 2024.
- Dilshani A., Amarasinghe P., and **Rathnayake M.***, "Multicomponent Heavy Metals Adsorption by Raw Coir Dust and Processed Coir Pith: Experimental Investigation and Life Cycle Analysis," Moratuwa Engineering Research Conference (MERCon), 2022, pp. 1-6. <https://doi.org/10.1109/MERCon55799.2022.9906278>
- Abey Suriya D. I., De Silva K.I., Wijesekara N.S.H., Sethunga G. S. M. D. P., and **Rathnayake M.***, 2021. Process Simulation-based Life Cycle Mass Flow Analysis for Fuel-grade Bioethanol Production from Water Hyacinth. Proceedings of the Multidisciplinary International Research Symposium of Rajarata University of Sri Lanka (ISymRU 2021), 21-22 December 2021, Virtual Conference, Sri Lanka.
- Jayasekara T. and **Rathnayake M.***, 2021. Techno-economic assessment of struvite phosphorus recovery from sewage sludge treatment in Sri Lanka. International Conference on Advancements in Computing (ICATC 2021), 18 December 2021, Virtual Conference, Sri Lanka. URL: <http://repository.kln.ac.lk/handle/123456789/24503>
- Fernando H.N.R. and **Rathnayake M.***, 2021. Assessment of Climate Change Impact and Economic Benefit of Plastic Waste Reuse for Asphalt Roads in Sri Lanka. International Conference on Environmental Governance 2021 (ICEG 2021), 24-25 November 2021, BMICH, Colombo, Sri Lanka.
- Wanninayake P., **Rathnayake M.**, Thushara D., and Gunawardena S.*, 2021. Optimization of Hemicellulose Recovery from Rice Straw for Biorefinery: Dilute Acid Pretreatment at Reduced Temperatures. Moratuwa Engineering Research Conference (MERCon), IEEE Xplore, 2021, pp. 315-320. <https://doi.org/10.1109/MERCon52712.2021.9525638>
- Senadeera K. R., Jayasinghe T.K., Jayasundara P. M., Nanayakkara G., **M. Rathnayake M.***, 2020. Investigation of CO₂ Sequestration Possibility via Indirect Mineral Carbonation using Waste Coal Fly Ash. Moratuwa Engineering Research Conference (MERCon), IEEE Xplore, 2020, pp. 119-123. <https://doi.org/10.1109/MERCon50084.2020.9185202>
- Jayasundara, P.M., Jayasinghe, T.K., **Rathnayake, M.***, 2019. Process Simulation-based Net Energy Analysis for Future Bioethanol Production as Commercial Biofuel from Waste Rice Straw in Sri Lanka. 24th International Forestry and Environment Symposium, 11-12 November 2019, Jetwing Blue Hotel, Negombo, Sri Lanka, pp.120.
- **Rathnayake, M.**, Tangtermsirikul, S., Toochinda, P.*, 2017. Low temperature sulfur dioxide capture using fly ash as solid sorbent. *Proceedings of Pure and Applied Chemistry International Conference (PACCON 2017)*, 2- 3 February 2017, Bangkok, Thailand, pp.384-389.
- **Rathnayake, H.H.M.P.*** and Dilshan, S.K.D.H.S., 2016. Process Simulation for Bio-Ethanol Dehydration by Azeotropic Distillation and Extractive Distillation. *Annual Transactions of the Institution of Engineers, Sri Lanka (IESL), VOLUME I - Part B Technical Papers, Annual Sessions*, 17 October 2016, pp.203-210.
- **Rathnayake, M.**, Vacharapong, P., Tangtermsirikul, S., Toochinda, P.*, 2015. CO₂ capture using Fly Ash and Bottom Ash as solid sorbent and their post capture applications. *3rd Annual Conference on Engineering and Information Technology (ACEAIT 2015)*, 22-24 March 2015, Osaka, Japan, Article No. ACEAIT-3657, pp. 73-83.

Non-Related Referees

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I hereby certify that the above indicated particulars of this Personal Profile are genuine and accurate.



Mahinsasa Rathnayake