RANGANA MADUSHAN MANAMENDRA

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Scholar: https://scholar.google.com/citations?hl=en&user=Um_jCEMAAAAJ
Github: https://github.com/ranganamadushan/

Research Summary

M.Phil. candidate in Flexible and Wearable Electronics with over three years of hands-on experience in **fabricating sensors and flexible electronic** devices using inkjet printing techniques. Skilled in **designing and developing custom instrumentation** for materials development and **characterization**, including the construction of a four-probe station, automated bending tester, and doctor-blading coater. Experienced in fabricating inkjet-printed interdigitated electrodes on polymer substrates. Proficient in advanced material characterization techniques such as Raman, FTIR, SEM, and XRD, as well as microcontroller-based system development (Arduino/AVR/ESP), PCB design, and data acquisition using LabVIEW. Seeking to contribute to **South Dakota State University's** Agricultural and Biosystems Engineering research on portable, real-time biosensors and instrumentation for agricultural and biological applications.

Education

Master of Philosophy June 2022 - Present
University of Colombo, Department of Physics

- **Fields**: Flexible & wearable electronics, Sensor fabrication, Power Electronics, Near field Communication, Condensed matter physics, Raman Spectroscopy, Instrumentation physics
  Research Supervisor: Dr. Darshana Lakmal Weerawarne

Bachelor of Science Honors in Engineering Physics January 2018 - June 2022
University of Colombo, Department of Physics GPA - 2.97/4.00

- **Relevant Coursework**: Undergraduate research, Analog and Digital Electronics I & II, Power Electronics, Electronic Communication Techniques, Methods in Computational Physics, Circuit Analysis and Simulation, Mathematical Physics, Design and Machining, Electromagnetic Fields, Electromagnetic Theory, Instrumentation Physics, Embedded Systems, Thermodynamics, Waves and Vibrations and Circuit Theory, Modern Optics, Modern Physics, Data Acquisition and Signal Processing, Introduction to Robotics
- **Relevant Labwork**: Physics Laboratory I and II, Electronics and Computing Laboratory I and II, Embedded Systems Laboratory, Design and Machining Laboratory, Engineering Physics Laboratory II

Diploma in IT 2019
University of Colombo School of Computing

- Relevant Coursework: Information Systems and Technology, Computer Systems, Programming, Web Application Development, Database Systems, Systems Analysis and Design

Research Interests

- Electronic sensor fabrication
- Printed flexible/wearable electronics
- Instrumentation Physics
- Condensed matter physics
- Electronics

Research and project experience

Research Assistant (UNESCO-TWAS Grant) July 2022 - Present
Department of Physics, University of Colombo

- Conducting research in flexible sensors, wearable electronics, Surface Enhanced Raman Spectroscopy, and Near Field Communication for flexible electronics
- Developing and maintaining instruments for ongoing research projects
- Guiding undergraduate research students by providing mentorship and fostering their academic and research skills
- Handled procurement and inventory management for laboratory equipment and materials.

Served as a Reviewer of the ICTer International Conference **2025**
University of Colombo School of Computing

Project experience

Building a Machine for Four-Probe Measurements August 2024-November 2024

- See more: https://github.com/ranganamadushan/4-probe-device

Building a Bending Machine for Material Characterization June 2023-August 2024

- See more: https://github.com/ranganamadushan/bending_machine

Building a Doctor Blading Device for Material Deposition June 2023-August 2024

- See more: https://github.com/ranganamadushan/doctor_blading

Undergraduate research project (Obtained an A) January 2021-April 2022

- Title - Inkjet printing of flexible multi-layer interdigitated electrodes
  Description - Inkjet printing enables precise control over the deposition of conductive materials onto flexible polymer substrates. A desktop inkjet printer was utilized to deposit conductive metal nanoparticle ink onto a flexible polymer substrate. The printer was assessed and optimized to achieve the highest quality electrode fabrication. This technology proved valuable in fabricating antennas, sensors, flexible Circuits, and more.
  Research Supervisor: Dr. Darshana Lakmal Weerawarne

Designed an electrical power calculator via LabVIEW February 2022
Undergraduate Level 4 Project for "Engineering Physics Laboratory II" (Obtained an A-)

- See more: https://github.com/ranganamadushan/mccb

Designed and constructed precise mechanical structures December 2020

Undergraduate Level 3 Project for "Design and Machining Laboratory" (Obtained an A)

- Precise mechanical structures were designed using computer-aided design (CAD) software like AutoCAD and Fusion 360. Once the designs were finalized, the structures were constructed using a variety of tools and equipment commonly found in workshop environments, such as lathes and milling machines.
- Improved Technical skills - Milling, Drilling, Lathe, Cutting, Technical Drawing, Designing

Designed an AVR-based wireless communication device November 2020

Undergraduate Level 3 Project for "Embedded Systems Laboratory" (Obtained an A-)

- The Atmel AVR environment was used as a microprocessor to construct a fully functional communication device capable of wirelessly transmitting and receiving data within a 1 km radius with a high degree of accuracy and precision
- Technical skills - C as a Programming language, AVR programming, PCB Designing

Participated in the Sri Lankan Robotics Challenge March 2018

University of Moratuwa, Bandaranayake Mawatha, Moratuwa 10400

- A line-following robot was built to detect and collect different types of coins based on their color. The robot was programmed to follow a complex path, detect the colors of the coins along the way, and collect them in separate containers designated for each specific color. The collected coins were then discharged into separate baskets located on the other side of the path.

Technical and soft skills

Preparation and characterization of materials - SEM Analysis, XRD Analysis, Raman Spectroscopy analysis, FTIR analysis
MCU Development platforms - Arduino, NodeMCU, AVR, ESP32
Programming/Markup languages - Python, C, C++,Java,(web) PHP, HTML, CSS, Javascript
Scientific software - MATLAB, LabVIEW, Scilab, GNU Octave
Machine shop experience - Lathe, Milling, CNC
PCB designing - Eagle, Proteus, KiCAD
CAD software - Autodesk Autocad
3D designing - Solid Works, Fusion 360
Simulation software - Cadence Orcad, Pspice, Proteus, Multisim, Tinkercad, ROS
Analysis and graphing - Minitab, Origin, STATA
Word processing and presentation - Latex, Microsoft Word, Microsoft PowerPoint, Microsoft Excel, Google Docs, Google Slides, Google Spreadsheets
Database management - MySQL
Content creation - Adobe Photoshop, Corel Draw, GIMP, Lightroom, Adobe Illustrator, Inkscape, Adobe Premiere Pro, Davinci Resolve, Adobe After Effects, Canva, Blender, OBS(Streaming), Krita

Publications

International Journals

1. Wikaramasinghe G. C., Manamendra R. M., Manuda K. R., Nissanka B., Weerawarne D. L., & Jayasundara D. R. (2024). *Binder-free conductive graphite coatings on polyimide substrates for applications in flexible electronics*. Journal of Coatings Technology and Research, pp.1-14. - doi.org/10.1007/s11998-024-01012-4

Conference Full Paper

2. Manamendra R.M., Wickramasinghe G.C., and Weerawarne D.L. (2025). *Fully Inkjet-Printed Multi-Material Humidity Sensor with Integrated Wheatstone Bridge*. Paper submitted for review to the 10th International Conference on Advances in Technology and Computing (ICATC 2025), Faculty of Computing & Technology, University of Kelaniya - **In Review**

Abstracts

3. Manamendra R.M*. and Weerawarne D.L. (2022), *Fabrication and characterization of flexible interdigitated electrodes using an office inkjet printer*, proceeding of Annual Research Symposium 2022, University of Colombo, Colombo 03, Sri Lanka, (16th November 2022), pg306. ISSN 2815-0481 - https://cmb.ac.lk/ars-2022
4. Manamendra R.M*., Wickramasinghe G.C., and Weerawarne D.L. (2023). *Inkjet printing of flexible interdigitated electrodes using an office inkjet printer for chemi- resistive glucose sensing*. proceeding of 2023 March Meeting, American Physical Society. Las Vegas:(20th March 2023) - https://meetings.aps.org/Meeting/MAR23/Session/EE08.4
5. Manamendra R.M*. Wickramasinghe G.C., Jayasundara D.R. and Weerawarne D.L. (2023), *Characterization of electrical and morphological features of graphene oxide traces dispensed on photo papers*, proceeding of Annual Research Symposium 2023, University of Colombo, Colombo 03, Sri Lanka, (3rd November 2023), pg214. ISSN 2815-0481 - https://cmb.ac.lk/ars-2023
6. Wickramasinghe G.C., Manamendra R.M., Jayasundara D.R., and Weerawarne D.L. (2023). *A Method for Production of Binder-Free Graphite Thin Films on Polyimide for Flexible Electronics*, Proceedings of 2023 March Meeting, American Physical Society. Las Vegas: (21th March 2023) - https://meetings.aps.org/Meeting/MAR23/Session/PP05.4
7. Madurawala K.H, Wickramasinghe G.C., Manamendra R.M., and Weerawarne D.L. (2023), *Selective Reduction of Graphene Oxide Deposited on Heatsensitive Substrates*, proceeding of RESCON 2023, Postgraduate Institute of Science, University of Peradeniya, Peradeniya 20400, Sri Lanka, (3rd and 4th November 2023), pg132. ISBN 978-955-8787-09-0
8. Sachith Jayanindu S.A, Wickramasinghe G.C, Manamendra R.M., and Weerawarne D.L. (2024). *Inkjet printing of sensors for Surface-enhanced Raman spectroscopy*. Proceedings of 2024 March Meeting, American Physical Society. Las Vegas:(4th March 2024) - https://meetings.aps.org/Meeting/MAR24/Session/AA06.2

9. Rasanjana N.W, Madurawala K.H, Manamendra R.M., Wickramasinghe G.C., and Weerawarne D.L. (2024). *Laser Engineered Fatigue Response of Flexible Interconnects*. proceeding of 2024 March Meeting, American Physical Society. Las Vegas: (4th March 2024) - https://meetings.aps.org/Meeting/MAR24/Session/BB06.12
10. Nawarathna N, Wickramasinghe G.C., Manamendra R.M., and Weerawarne D.L. (2024). *Direct Current Response of Inkjet-printed Flexible Interconnects*. proceeding of 2024 March Meeting, American Physical Society. Las Vegas: To be published on 4th March 2024 - https://meetings.aps.org/Meeting/MAR24/Session/AA06.10
11. Rajapaksha R.P.U.I., Wickramaarachchi S.H., Manamendra, R.M., Wijesinghe W.L.P.K., and Weerawarne, D.L. (2025). *Crosstalk Characterization in Printed Flexible Circuits*. Proceedings of the 81st Annual Sessions 2025, Sri Lanka Association for the Advancement of Science. Colombo, Sri Lanka, (To be published at 7th - 12th December 2025) - **Approved Abstract**

Teaching experience

Visiting Lecturer February 2025 - present
University College of Ratmalana, University of Vocational Technology
Subject: Electrical Power Systems

Assistant Lecturer February 2025 - present
Instructor August 2023 - January 2025
University of Colombo School of Computing
Teaching Assistant in the following courses

- Responsible for conducting practicals - Electronics Laboratory, Laboratory II, Internet and web technologies, Functional Programming, Business Statistics
- Responsible for conducting tutorials - Mathematical Methods, Discrete Mathematics, Data structures and algorithms, Digital forensics, Probability and Statistics, Operations Research (Responsible for conducting Tutorials and laboratory work)
- Subject co-ordinator - Statistics
- Served as a member of the ICTer International Conference Organizing Committee in 2023 and 2024.

Temporary Demonstrator July 2022 - September 2023
Department of Physics, University of Colombo, Sri Lanka
Teaching Assistant in the following courses

- Analog Electronics Laboratory, Digital Electronics Laboratory (For Bachelor of Science Degree Program in Electronics and Automation Technologies) - Responsible for designing and conducting practical components and performance assessment

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Other experience

Member - IEEE 2024 - present

Vice president 2021-2022
Treasurer 2020-2021
Colombo Innovations and Robotics Club
University of Colombo, Colombo 00300, Sri Lanka

Vice President 2020-2022
Colombo Beacon

Editor 2019-2020
SCINTILLA-Nuclear Science Society
University of Colombo, Colombo 00300, Sri Lanka

References

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