Md. Mhamud Hussen Sifat

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Research and Teaching Experience

- **Digital Twin Electric Grid** — Robotics and Automation Lab, RUET
  Undergraduate Thesis — *06/2022 – present*
  - **Case Study**: Started with a case study and wrote a systematic review article.
  - **Conceptualization**: Proposed a seven-layer conceptual framework developed with a systems engineering approach.
  - **Implementation**: Implemented the proposed conceptual framework to a laboratory microgrid.
  - **Operations**: Real-time bidirectional communication, sensory data management, control system, system modeling (ML), fault classification, autonomous and cloud supervisory control.
- **Development of RoboNurse**
  For remote nursing during Covid-19 — *09/2020 – 2022*
  - **Development**: Robot design (motion planning, automated medication, 4-DOF robotic arm), implementation, trajectory planning, iterative testing.
  - **Operations**: Routine checkup, medication, real-time cloud update, supervisory control via IoT cloud.
- **Physics and Mathematics Tutor** — Self-employment
  Supplementary teacher — *08/2018 – Present*
  - **Task**: I teach O and A-level students, prepare tests and evaluate their academic progress –12 hrs/week.
  - **Topics**: Calculus, probability, matrix, polynomials, mechanics, modern and classical physics, etc.

Skills

- **Platforms**: MATLAB, Simulink (ROS, Robotics system toolbox, Simscape, Lidar toolbox), Proteus, Solid Works, AutoCAD, Microchip Studio, LOGO! (PLC), MS Office, Logisim, Arduino.
- **Programming languages**: C, C++, Python, LaTeX, Matlab, Ladder diagram (LD), Instruction list (IL).
- **Technical**: Testbed, sensor, actuator design, calibration, performance test, transnational and rotational mapping, trajectory planning, control system design, serial communication.
- **Soft skills**: Resourcefulness, adaptive development, time management, critical thinking, problem-solving, goal decomposition.

Publications

- **Peer Reviewed**
  - Sifat, M. M. H., Choudhury, S. M., Das, S. K., Ahamed, M. H., Muyeen, S. M., Hasan, M. M., ... & Das, P. (2022). Towards electric digital twin grid: Technology and framework review. Energy and AI, 100213.
- **Under Review**
  - Sifat, M. H., Das, S. K., & Choudhury, S. M. Design, Development, and Optimization of a Conceptual Framework of Digital Twin Electric Grid Using Systems Engineering Approach. Development, and Optimization of a Conceptual Framework of Digital Twin Electric Grid Using Systems Engineering Approach. (Preprint)
  - Sifat, M. H., Choudhury, Das, S. K., Alam K. S., Sakib M. S. I., & Kaif A. M. A. D. Design and Experimental Implementation of a Digital-Twin Microgrid for Optimum Operation with Self-Healing Control Strategies– **Journal:** IEEE Transaction on Smart Grid.
  - Sifat, M. H.,& Das, S. K. Proactive and Reactive Maintenance Strategies for Self-Healing Digital Twin Islanded Microgrids using Fuzzy Logic Controllers and Machine Learning–**Journal:** IEEE Transactions of Power Systems
- **In Process**
  - Sifat, M. H., Das, S. K., & Rokunuzzaman, M. IoT-Enabled RoboNurse for Effective Infectious Pandemic Management: A Systems Engineering Approach–**Intended journal:** IEEE Transactions on Medical Robotics and Bionics.

Projects

- **3 - DOF Robotic Arm**
  - Developed a sorting robot based on product colors.
  - **Skills**–Sensor calibration, Simulink modeling, ROS simulation, practical deployment and noise management, servo control, cascaded operation.
- **Biped Walking Mechanism**
  - Replicating human walking mechanism–a cost-effective approach
  - **Skills**–Critical thinking, link, and joint state transition planning, custom servo mechanism, error optimization.

Research Interests

- Robotics, mechatronic systems design, humanoid robots, UGVs, digital twin technology, smart grid control, management, and optimization.

Education

- **Rajshahi University of Engineering & Technology** Rajshahi-6204, Bangladesh
  BSc in Mechatronics Engineering *2018 - Present*
  - **CGPA**: : 3.51/4 (till 6^{th} semester). Possible date of graduation **September 2023**
  - **Related Courses**: : Robotics, Automation, HRI, Design of Mechatronic Systems, AI, ML Algorithms, DSP & Machine Vision, Embedded Systems, Hydraulic and Pneumatic Control, Control Systems, Numerical Analysis, and Statistics.