



AURKO FOUNDATION

Assembly to Utilize Research and Knowledge Outcome Foundation
for mankind

Reg. Office:

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Ref: AURKO/Research Grant/2024-2025/235

Date: December 20, 2024

To
Khondoker Ziaul Islam
Lecturer, Applied Engineering
SMTAFE, Western Australia

Subject: Confirmation of Research Grant.

Dear Mr. Islam,

It is our pleasure to inform you that the Scientific Review Committee of the Assembly to Utilize Research and Knowledge Outcome (AURKO) Foundation has selected your research proposal titled "Leveraging Machine Learning for Medication" for a research grant.

We request you to initiate your research work at the earliest convenience. The AURKO Foundation will formalize this arrangement through a detailed agreement, which will be shared with you shortly.

Should you have any queries or require further clarifications, please feel free to contact our Principal Research Consultant, as the details provided below:

Dr. Jannatul Nayeem
Phone: +88 01911491027
Email: jannatultihee@gmail.com

We wish you success with your research and look forward to your significant contributions in this field.

Thank you.

Sincerely,

(Salma Sultana)
Chairman
AURKO Foundation



22nd September 2024

To
Chairman
AURKO Foundation
Aftabnagar, Dhaka, Bangladesh

Subject: Application for AURKO foundation research grant.

Dear Sir,

In reference to your Announcement of AURKO foundation research grant, I am writing to submit a proposal for a grant to fund a project aimed at advancing healthcare through the integration of machine learning (ML) models for optimizing medication prescriptions. As part of this project, we seek to develop robust ML algorithms that predict medication dosages tailored to individual patient characteristics, particularly in respiratory care, where precise dosing is crucial.

The project will address critical gaps in medication dosing by combining clinical data with physiologically based pharmacokinetic models, allowing for biologically informed and personalized treatment regimens. Furthermore, by improving the speed and accuracy of medication diagnosis, the project aims to reduce human error and enhance the overall effectiveness of treatment.

We believe that this initiative has the potential to revolutionize clinical decision making, ensuring safer, more effective healthcare solutions in Bangladesh. I will be grateful if kindly review the Proposal and allow me to contribute.

Thank you for your time and consideration.

Sincerely,



Khondoker Ziaul Islam

Lecturer, Applied Engineering, SMTAFE, Western Australia
Casual Lecturer, Murdoch University, Western Australia
Casual Lecturer, Curtin University, Western Australia
Assistant Professor (On leave), BUBT, Bangladesh

Assembly to Utilize Research and Knowledge Outcome (AURKO) Foundation

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Project Proforma (PP)-01

Research Grants

Proposals should be submitted in 4 (four) copies

PART - A

1. Project Title: Leveraging Machine Learning for Medication
2. Principal Investigator: Khondoker Ziaul Islam (Annex 1)
3. Co-investigator(s): 1 Md Sanwar Hossain (Annex 2)
2 Dr. Md. Rashidul Hassan (Annex 3)
4. Place of study/Institution(s): N/A
5. Sponsoring/Collaborating Agencies: N/A
6. Duration: 1 year
7. Date of Commencement: As soon as the Grant is formally approved (Proposed: January 2025).
8. Date of Completion: December 2025
9. Total Cost: 500000/-
10. Other Support for Proposed Research:
 - (1) Is this research project being supported by any other source? Yes No
 - (2) Has an application for funding of this project been submitted to any other organization(s)? Yes No

If 'Yes' to 10(1) or 10(2) above, please indicate the organization(s) and amount of funds.

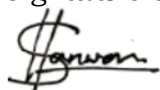
11. Date of Submission : 22/09/2024

12. Signature of Principal Investigator :



Khondoker Ziaul Islam
Lecturer, Applied Engineering, SMTAFE, Western Australia, Australia
PhD researcher, Murdoch University, Western Australia, Australia
Casual Lecturer, Murdoch University, Western Australia, Australia
Casual Lecturer, Curtin University, Western Australia, Australia
Assistant Professor (On leave), BUBT, Bangladesh

13. Signature of Co-Investigator(s) :



Md Sanwar Hossain
PhD researcher, University of Wollongong, Australia
Assistant Professor (On leave), BUBT, Bangladesh



Dr. Md. Rashidul Hassan
Visiting Professor of Respiratory Medicine, Anwer Khan Modern Medical
College, Dhaka, Bangladesh
Chairman, Ingenious Health Care Limited

PART - B

PRINCIPAL INVESTIGATOR INFORMATION SHEET

1. (i) Name: Khondoker Ziaul Islam
 - (ii) Designation:
Lecturer, Applied Engineering, SMTAFE, Western Australia.
PhD researcher, Murdoch University, Western Australia.
Casual Lecturer, Murdoch University, Western Australia.
Casual Lecturer, Curtin University, Western Australia.
Assistant Professor (On leave), BUBT, Bangladesh.
 - (iii) Official Address with telephone:
SMTAFE, Burslem Drive, *Thornlie* WA 6108. T: 1800 001 001
Murdoch University, 90 South St, Murdoch WA 6150
 - (iv) Present Residential Address with telephone:
45 Coops Avenue, Thornlie, WA 6108. M: +61426953720
2. Academic Background:

Degree	University	Field	Year
Doctor of Philosophy (thesis submitted)	Murdoch University, WA, Australia.	Information Technology	2024
Master of Science	Islamic University of Technology (IUT), Bangladesh.	Electrical and Electronic Engineering	2015
Bachelor of Science (Hons.)	Islamic University of Technology (IUT), Bangladesh.	Electrical and Electronic Engineering	2011

3. Field of Speciality: Wireless Communication, IoT and Sensor Networking, Machine Learning

4. (a) Research Experience: Khondoker Ziaul Islam is an experienced researcher in the fields of Wireless Communication, IoT, Sensor Networking, and Machine Learning. He has contributed to various industry-collaborative projects, including funded research initiatives in partnership with the Department of Primary Industries and Regional Development (DPIRD), Australia.

(b) Other Experience: Khondoker Ziaul Islam has an extensive teaching and research career spanning academia and industry. Since February 2024, he has been serving as a Lecturer in Applied Engineering at South Metropolitan TAFE (SMTAFE), Western Australia, while concurrently working as a Casual

Tutor in Information Technology at Murdoch University since August 2022. Previously, he held roles as a Casual Tutor in the School of Engineering and Energy at Murdoch University (August 2021–December 2022) and in the School of Electrical Engineering, Computing, and Mathematical Sciences at Curtin University (July–December 2022). He also contributed as a Research Assistant at Murdoch University (August 2021–July 2022). In Bangladesh, he has been associated with the Bangladesh University of Business and Technology (BUBT) since 2012, serving as an Assistant Professor in Electrical and Electronic Engineering from 2016 onward, following his tenure as a Lecturer from 2012 to 2016. Additionally, Dr. Islam gained industry experience as a Maintenance Engineer at Rupa Group of Industries, Bangladesh, from January to September 2012.

5. Percentage of time to be devoted to this Project: 0.1FT
6. Number of Scientific Publications: 31 (List in Annex 1)



Signature of Principal Investigator

PART - C

1. PROJECT TITLE: Leveraging Machine Learning for Medication

2. SUMMARY: This proposal aims to address challenges in medication through machine learning (ML) applications. By leveraging decision trees, regression analysis, and ensemble methods, this study seeks to enhance the precision of drug dosing predictions. Special attention is given to respiratory infections (e.g., pneumonia, bronchitis), chronic conditions (e.g., asthma, COPD), and structural abnormalities (e.g., scoliosis affecting the chest) applications, where accurate dosing is critical due to limited clinical studies. The proposal draws on findings from recent systematic reviews and suggests an integrated ML-based approach combined with physiologically based pharmacokinetic models.

PART - D

1. INTRODUCTION:

Artificial intelligence (AI) and machine learning (ML) are increasingly utilized in medicine, particularly in respiratory care. AI excels in tasks such as image recognition, assisting in the evaluation of lung cancer, diagnosing fibrotic lung disease, interpreting pulmonary function tests, and identifying obstructive and restrictive lung diseases like asthma and COPD. Developing AI algorithms requires large, high-quality datasets and must overcome challenges such as overlapping diagnostic criteria and variable data quality. While AI continues to support clinicians in diagnosis and management, confidence in its use is still growing. Its integration holds significant promise for improving respiratory healthcare outcomes.

AI, ML, and deep learning are hierarchical concepts. AI simulates human intelligence, encompassing reasoning, learning, and information processing. ML, a subset of AI, identifies patterns in data, using supervised (labeled data) or unsupervised (unlabeled data) learning. Traditional statistical methods are limited in handling large, complex datasets, but ML can analyze nonlinear relationships, thereby improving outcomes. Deep learning, a subset of ML, utilizes raw data to automatically discover features and has made significant advancements in image and speech recognition, as well as drug activity prediction [1-10].

AI processes vast amounts of healthcare data, aiding diagnosis by uncovering patterns in diverse information. It is widely applied in classification tasks, such as identifying skin lesions or brain tumors. AI also facilitates remote test evaluations, like tuberculosis detection, with high sensitivity (97.3%) and specificity (100%) in pulmonary cases [13-15]. Approved devices use AI to screen for diabetic retinopathy and stroke indicators, providing timely results and improving patient outcomes [16-18]. Errors often arise from poor training data or model selection, highlighting the need for robust development frameworks [21-23].

In respiratory care, AI is used for evaluating lung cancer CT scans, diagnosing fibrotic lung disease, and interpreting pulmonary function tests. Algorithms predict lung cancer risk by analyzing temporal and spatial changes [24]. Deep learning has enhanced diagnostic accuracy for fibrotic lung diseases, with automated systems achieving performance comparable to radiologists at a lower cost [26]. Deep neural networks (DNNs) have been applied to diagnose conditions such as tuberculosis, malignant nodules, and pneumothorax with high accuracy (e.g., 94.6% for chest radiographs) [27-35]. In lung cancer risk prediction, DNNs have outperformed radiologists [37]. These advancements improve diagnostic precision and increase accessibility, particularly in resource-limited settings.

2. OBJECTIVES:

The primary objectives of this study are:

1. Development of Robust ML Algorithms for Accurate Medication Dosing Prediction

The first objective focuses on creating machine learning (ML) algorithms tailored to optimize medication dosing. These algorithms will analyze diverse patient-specific factors, such as age, weight, medical history, and biomarkers, to predict precise dosages. Unlike traditional approaches, ML leverages large datasets to identify complex, nonlinear relationships between inputs and outcomes. This ensures personalized medication regimens that improve treatment efficacy and minimize risks associated with over- or under-dosing. Advanced ML techniques, including ensemble methods and neural networks, will be explored to enhance accuracy and reliability.

2. Focus on Respiratory Conditions and Addressing Critical Gaps in Clinical Data

This objective targets respiratory diseases, including infections (e.g., pneumonia and bronchitis), chronic conditions (e.g., asthma and COPD), and structural chest abnormalities (e.g., scoliosis). Respiratory conditions often suffer from diagnostic and treatment challenges due to heterogeneous symptoms and insufficient clinical data. By focusing on these conditions, the project aims to develop ML tools that address the unique complexities of respiratory medicine. These tools will integrate patient histories, imaging data, and pulmonary function test results to provide accurate diagnoses and personalized treatment plans, bridging the existing gaps in clinical knowledge.

3. Integration of Physiologically Based Pharmacokinetic Models with ML

Physiologically based pharmacokinetic (PBPK) models provide a mechanistic understanding of drug absorption, distribution, metabolism, and excretion. Integrating these models with ML will enhance the predictive accuracy of dosing algorithms. This synergy allows the system to simulate drug behavior in specific patient populations, such as those with respiratory conditions or structural abnormalities, accounting for variations like lung function and systemic metabolism. This integration will ensure robust, biologically informed predictions that improve clinical outcomes and support evidence-based decision-making for medication management.

3. RATIONALE:

Medication prescription remains a critical yet complex process, especially in respiratory care. Off-label drug use constitutes nearly half of all respiratory prescriptions, often leading to incorrect dosing and adverse effects. Traditional dosing methods, which rely on body weight or surface area, lack sufficient precision. Recent advancements in ML provide a promising solution to address these challenges.

4. METHODOLOGY:

Literature Review: Review existing datasets and models, focusing on respiratory applications.

2. Data Collection: Utilize publicly available and locally collected datasets (e.g., IWPC, MIMIC-III) and collaborate with healthcare institutions for new data.

3. Model Development: Develop and evaluate models using decision trees, regression methods, and ensemble techniques.

4. Validation: Validate models using high-quality datasets and IJMEDI checklist for quality assurance.

5. Deployment: Create a user-friendly online platform for clinicians to access dosing recommendations.

The approaches and methodologies to achieve the goals of this research project are briefly discussed below under the eight work packages (WPs):

WP-1: Data Collection and Validation

This work package focuses on leveraging publicly available datasets (e.g., IWPC, MIMIC-III) while collaborating with healthcare institutions to collect locally relevant data. Given that regional and environmental factors significantly influence disease patterns and medication efficacy, incorporating locally collected data is critical for tailoring machine learning algorithms to specific contexts. Additionally, the proposed models will be rigorously validated against publicly available datasets and state-of-the-art algorithms to ensure their effectiveness and reliability.

WP-2: Development of Advanced ML Algorithms for Medication Dosing

This work package will focus on designing and implementing robust machine learning algorithms tailored for accurate medication dosing. It will involve analyzing diverse patient-specific factors such as age, weight, medical history, and biomarkers to predict optimal dosages. Advanced ML techniques, including ensemble methods and neural networks, will be employed to identify complex, nonlinear relationships between input variables and dosing outcomes. Rigorous testing and validation will ensure high accuracy and reliability of these algorithms.

WP-3: Creation of ML Tools for Addressing Respiratory Medicine Challenges

This work package aims to develop machine learning tools to address the diagnostic and therapeutic complexities of respiratory diseases, including pneumonia, asthma, COPD, and structural chest abnormalities. These tools will integrate patient histories, imaging data, and pulmonary function test results to provide accurate diagnoses and personalized treatment plans. Special emphasis will be placed on filling gaps in clinical data and improving diagnostic precision for heterogeneous symptoms.

WP-4: Integration of PBPK Models with Machine Learning

This work package will focus on integrating physiologically based pharmacokinetic (PBPK) models with machine learning algorithms to improve the predictive accuracy of

medication dosing. The integration will allow the simulation of drug absorption, distribution, metabolism, and excretion in patient populations with varying physiological conditions. By accounting for variations such as lung function and systemic metabolism, the combined models will ensure biologically informed predictions that enhance clinical outcomes and support evidence-based medical decision-making.

5. IMPACT OF RESEARCH:

This project aims to integrate machine learning (ML) models to optimize medication prescriptions. The key objectives include:

1. Developing robust ML algorithms to predict medication dosages based on individual patient characteristics.
2. Addressing gaps in medication dosing by integrating clinical data with physiologically based pharmacokinetic models.
3. Establishing faster and more accurate diagnostic methods for medication, minimizing human error and enhancing treatment precision.

6. FACILITIES

The experiments will perform on a desktop computer, with an Intel(R) Core (TM) i7-6800K processor, 64 gigabytes of RAM, and a NVIDIA GeForce GTX 1080 Graphic Processing Unit. We used the Professional Edition of the Windows 10 operating system. The ML models were developed using Python 3.8 and Scikit-learn 1.1. We will utilize publicly available and locally collected datasets (e.g., IWPC, MIMIC-III) and collaborate with healthcare institutions for new data.

7. APPROVAL OF THE HEAD OF THE DEPARTMENT/INSTITUTE:

N/A

8. FLOW CHART

	January 2025 - December 2025				Deliverables
	Q1	Q2	Q3	Q4	
Principal investigator	WP1,2	WP2,3	WP3,4	WP4, Report	Report -Q4/2025
Co-investigator 1	WP2	WP2,3	WP3,4	WP4, Report	
Co-investigator 2	WP1	WP1	WP1	Report	

9. ETHICAL IMPLICATIONS

All the protocols, research methods and procedures will be approved by the Ethical Review Committee of the Institute of Chest Diseases Management &

Research. Informed written/verbal consent of the participants will be obtained before data collection. The informed consent form will contain the purpose, methods and benefits of the study. Consent will be conducted in the local language as Bengali. Confidentiality of data will be ensured strictly. Data will be preserved in the computer by anonymity and will be used for the purpose of this study only.

10. REFERENCES:

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Note: All citations should be referenced in the reference section/ bibliography.

PART - E

BUDGET

I. **Total Budget:** 500000/-

II. **Detailed Budget:**

1. Personnel Cost: 132000/-

Description	No_ Unit	Unit Cost	Amount (in BDT)
Principal Investigator (for 1 year)	1	5000	60000
Co-Investigator 1 (for 1 year)	1	3000	36000
Co-Investigator 2 (for 1 year)	1	3000	36000

2. Field Expenses/Laboratory Cost:

Description	No_ Unit	Unit Cost	Amount (in BDT)
Computational setup Intel(R) Core (TM) i7-6800K processor, 64 gigabytes of RAM, and a NVIDIA GeForce GTX 1080 Graphic Processing Unit. We used the Professional Edition of the Windows 10 operating system. The ML models were developed using Python 3.8 and Scikit-learn 1.1.	1	120000	120000
Hardware and server setup with power supplies and space rent: (a) Sensor devices (b) ChirpStack server.	1	100000	100000
Data collection	5	10000	50000

3. Supplies and Materials: NA
4. Patient Cost: NA
5. Travel Cost: NA
6. Transportation of Goods: NA
7. Office Stationery: 5000/-
8. Data Processing/Computer Charges: NA

9. Printing and Reproduction: 5000/-
10. Contractual Services: Other than manpower
11. Miscellaneous: Not exceeding 2.5% of the total budget. Items & quantities to be specified
12. Administrative Overhead: 5% of the total project cost will be taken by AURKO Foundation as overhead cost.

PART-F

Assembly to Utilize Research and Knowledge Outcome (AURKO) Foundation

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Application for Ethical Clearance

- 1. Principal Investigator:** Khondoker Ziaul Islam
Lecturer, Applied Engineering, SMTAFE, Western Australia
PhD researcher, Murdoch University, Western Australia
SMTAFE, Burslem Drive, *Thorndale* WA 6108. T: 1800 001 001
Murdoch University, 90 South St, Murdoch WA 6150
- 2. Co-Investigator(s):**
 1. Md Sanwar Hossain
PhD researcher, University of Wollongong, Australia
Assistant Professor (on leave), Bangladesh University of Business and Technology, Bangladesh
 2. Dr. Md. Rashidul Hassan
Visiting Professor of Respiratory Medicine, Anwer Khan Modern Medical College, Dhaka, Bangladesh

Chairman, Ingenious Health Care Limited
- 3. Place of the Study/Institution(s):** N/A
- 4. Title of Study:** Leveraging Machine Learning for Medication
- 5. Type of Study:** This represents a data-driven implementation of Artificial Intelligence within the medical sector.
- 6. Duration:** 1 year
- 7. Total Cost:** 500000/-
- 8. Funding Agency:** N/A

**Circle the appropriate answer to each of the following
(If not Applicable write NA)**

1. Source of Population:

- | | | |
|--|------|----|
| (a) Ill Subjects | √Yes | No |
| (b) Non-ill Subjects | Yes | No |
| (c) Minors or persons under guardianship | Yes | No |

2. Does the study involve:

- | | | |
|---|-----|-----|
| (a) Physical risks to the subjects | Yes | √No |
| (b) Social Risks | Yes | √No |
| (c) Psychological risks to subjects | Yes | √No |
| (d) Discomfort to subjects | Yes | √No |
| (e) Invasion of the body | Yes | √No |
| (f) Invasion of Privacy | Yes | √No |
| (g) Disclosure of Information damaging to subject or others | Yes | √No |

3. Does the study involve:

- | | | |
|--|-----|-----|
| (a) Use of records, (hospital, medical, death, birth or other) | Yes | √No |
| (b) Use of fetal tissue or abortus | Yes | √No |
| (c) Use of organs or body fluids | Yes | √No |

4. Are subjects clearly informed about:

- | | | |
|---|------|----|
| (a) Nature and purposes of study | √Yes | No |
| (b) Procedures to be followed including alternatives used | √Yes | No |
| (c) Physical risks | √Yes | No |
| (d) Private questions | √Yes | No |
| (e) Invasion of the Body | √Yes | No |
| (f) Benefits to be derived | √Yes | No |
| (g) Right to refuse to participate or to withdraw from study | √Yes | No |
| (h) Confidential handling of data | √Yes | No |
| (i) Compensation where there are risks or loss of working time or privacy is involved in any particular procedure | √Yes | No |

5. Will signed consent form/verbal consent be required:

- | | | |
|--|------|-----|
| (a) From Subjects | √Yes | No |
| (b) From parent or guardian (if subjects are minors) | Yes | √No |

6. Will precautions be taken to protect anonymity of subject

- | | |
|------|----|
| √Yes | No |
|------|----|

Khondoker Ziaul Islam

✉ ziaul.i@bubt.edu.bd

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📄 <https://scholar.google.com/citations?user=RBJG4GMAAAAJ&hl=en>

📄 <https://www.researchgate.net/profile/Khondoker-Islam>







Education

- 2021 – Present  **PhD in Information Technology (thesis submitted)**
Murdoch University, WA, Australia.
Thesis title: *Localization, Tracking, and Data Transmission Using LoRa.*
- 2013 – 2015  **Master of Science in Electrical and Electronic Engineering**
Islamic University of Technology (IUT), Bangladesh
CGPA: 3.92 (in a scale of 4.00)
Thesis title: *Resource Allocation and DRX Mechanism for LTE and LTE Advanced.*
- 2008 – 2011  **Bachelor of Science(Hons.) in Electrical and Electronic Engineering**
Islamic University of Technology (IUT), Bangladesh
CGPA: 3.88 (in a scale of 4.00)
Thesis title: *Radio Access Network Requirement for New Deployment of WIMAX in Dhaka.*


Employment History

- February, 2024 – Present  **Lecturer**, Applied Engineering, SMTAFE, Western Australia, Australia.
- August, 2022 – June, 2024  **Casual Tutor**, Information Technology, Murdoch University, Australia.
- August, 2021 – December 2022  **Casual Tutor**, School of Engineering and Energy, Murdoch University, Australia.
- August, 2021 – July 2022  **Research Assistant**, School of Engineering and Energy, Murdoch University, Australia.
- July, 2022 – December 2022  **Casual Tutor**, School of Electrical Engineering, Computing, and Mathematical Sciences, Curtin University, Australia.
- October, 2016 – Present  **Assistant Professor**, Electrical and Electronic Engineering, Bangladesh University of Business and Technology (BUBT), Bangladesh.
- October, 2012 — October, 2016  **Lecturer**, Electrical and Electronic Engineering, Bangladesh University of Business and Technology (BUBT), Bangladesh.
- Jan, 2012 — September, 2012  **Maintenance Engineer**, Rupa Group of Industries, Bangladesh.

Technical Skills

- Programming Language  Python, R, Assembly Language, C, C++.
- Scripting Language  JavaScript, HTML, CSS, PHP, SQL, XML/XSL, \LaTeX .
- Databases  MySQL, PostgreSQL, Oracle.
- Simulation  PSpice, Verilog, RETScreen, PSpice, LT Spice, NG Spice, ICAP, MATLAB, HOMER, SIMULINK, PSCAD, PSIM.
- Tools  PyCharm, Anaconda, Microsoft Visual Studio, REDCap, Chirpstack, spss, JDK, J2me, Macromedia Dreamweaver, ArgoUML, Netbeans, Idea.
- Operating Systems  Microsoft Windows, Linux, Solaris, FreeBSD.

Technical Skills (continued)

Misc.  Academic research, teaching, training, consultation, L^AT_EX typesetting and publishing, blackboard collaborate and Echo 360 [Online teaching].

Research Publications

Journal Articles

- 1 Islam, K. Z., Murray, D., Diepeveen, D., Jones, M. G., & Sohel, F. (2024a). Lora localisation using single mobile gateway. *Computer Communications*, 219, 182–193.
[doi:https://doi.org/10.1016/j.comcom.2024.03.012](https://doi.org/10.1016/j.comcom.2024.03.012)
- 2 Islam, K. Z., Murray, D., Diepeveen, D., Jones, M. G., & Sohel, F. (2024b). Lora-based outdoor localization and tracking using unsupervised symbolization. *Internet of Things*, 101016.
[doi:https://doi.org/10.1016/j.iot.2023.101016](https://doi.org/10.1016/j.iot.2023.101016)
- 3 Islam, K. Z., Murray, D., Diepeveen, D., Jones, M. G., & Sohel, F. (2023). Machine learning-based lora localisation using multiple received signal features. *IET Wireless Sensor Systems*.
- 4 Hossain, M. S., Islam, K. Z., Alharbi, A. G., Shafullah, M., Islam, M. R., & Fekih, A. (2022). Optimal design of a hybrid solar pv/bg-powered heterogeneous network. *Sustainability*, 14(4), 2201.
- 5 Islam, K. Z., Hossain, M. S., Ruhul Amin, B., Shafullah, G., & Sohel, F. (2022). Renewable energy-based energy-efficient off-grid base stations for heterogeneous network. *Energies*, 16(1), 169.
- 6 Hossain, M. B., Kabir, M. A., Rahman, M. M., Roy, S., Abdulrazak, L. F., Hossain, M. S., ... Pathan, M. I. (2021). Hybrid structure based high performance spr sensor: A numerical approach of structure optimization for dna hybridization. *Optical and Quantum Electronics*, 53, 1–19.
- 7 Hossain, M. S., Alharbi, A. G., Islam, K. Z., & Islam, M. R. (2021). Techno-economic analysis of the hybrid solar pv/h/fuel cell based supply scheme for green mobile communication. *Sustainability*, 13(22), 12508.
- 8 Islam, K. Z., Ahasan, M. A. A., Hossain, M. S., Rahman, M. H., Mousumi, U. S., & Asaduzzaman, M. (2021). A smart fluorescent light spectroscope to identify the pork adulteration for halal authentication. *Food and Nutrition Sciences*, 12(1), 73–89.
- 9 Islam, K. Z., Hossain, M., Amin, B., & Sohel, F. (2021). Energy-cost aware off-grid base stations with iot devices for developing a green heterogeneous network. *arXiv preprint arXiv:2110.05906*.
- 10 Nadia, A., Hossain, M. S., Hasan, M. M., Afrin, S., Shafullah, M., Hossain, M. B., & Islam, K. Z. (2021). Determination of transmission reliability margin for brownout. *AIMS Energy*, 9(5), 1009–1026.
- 11 Nadia, A., Hossain, M. S., Hasan, M. M., Islam, K. Z., & Miah, S. (2021a). European journal of electrical engineering. *European Journal of Electrical Engineering*, 23(2), 157–163.
- 12 Nadia, A., Hossain, M. S., Hasan, M. M., Islam, K. Z., & Miah, S. (2021b). Quantifying trm by modified dcq load flow method quantifying trm by modified dcq load flow method. *European Journal of Electrical Engineering*, 23(2), 157–163.
- 13 Hossain, M. B., Hossain, M. S., Islam, S. R., Sakib, M. N., Islam, K. Z., Hossain, M. A., ... Cho, G. H. (2020). Numerical development of high performance quasi d-shape pcf-spr biosensor: An external sensing approach employing gold. *Results in Physics*, 18, 103281.
- 14 Hossain, M. S., Jahid, A., Islam, K. Z., Alsharif, M. H., Rahman, K. M., Rahman, M. F., & Hossain, M. F. (2020). Towards energy efficient load balancing for sustainable green wireless networks under optimal power supply. *IEEE Access*, 8, 200635–200654.
- 15 Hossain, M. S., Jahid, A., Islam, K. Z., & Rahman, M. F. (2020). Solar pv and biomass resources-based sustainable energy supply for off-grid cellular base stations. *IEEE access*, 8, 53817–53840.

- 16 Hossain, M. S., Jahid, A., Ziaul Islam, K., Alsharif, M. H., & Rahman, M. F. (2020). Multi-objective optimum design of hybrid renewable energy system for sustainable energy supply to a green cellular networks. *Sustainability*, 12(9), 3536.
- 17 Hossain, M. S., Ziaul Islam, K., Jahid, A., Rahman, K. M., Ahmed, S., & Alsharif, M. H. (2020). Renewable energy-aware sustainable cellular networks with load balancing and energy-sharing technique. *Sustainability*, 12(22), 9340.
- 18 Hossain, M. S., Islam, K. Z., Hossain, M. E., & Biswas, S. (2020). Techno-economic investigation of optimal solar power system for lte cellular base stations. *energy sources*, 26(27), 35.
- 19 Mousumi, U. S., Asaduzzaman, M., Zardar, M. A., & Islam, K. Z. (2020). Techno-economic evaluation of hybrid supply system for sustainable powering the saint martin island in bangladesh. *renewable energy*, 1(1).
- 20 Nadia, A., Chowdhury, A. H., Mahfuj, E., Hossain, M. S., Islam, K. Z., & Rahman, M. I. (2020). Determination of transmission reliability margin using ac load flow. *AIMS Energy*, 8(4), 701–720.
- 21 Rahaman, M. M., Mahfuj, E., Haque, M. M., Shekdar, R., & Islam, K. Z. (2020). Educational robot for learning programming through blockly based mobile application. *Journal of Technological Science & Engineering (JTSE)*, 1(2), 21–25.
- 22 Hossain, M. F., Mahin, A. U., Debnath, T., Mosharraf, F. B., & Islam, K. Z. (2019). Recent research in cloud radio access network (c-ran) for 5g cellular systems-a survey. *Journal of Network and Computer Applications*.
- 23 AL-AMIN, M. R., & ISLAM, K. Z. (2016). Radio access network requirement for new deployment of wimax in dhaka. *Journal of Computer and Communication Technology: Vol*, 7(3), 6.
- 24 Kawser, M. T., Islam, M. R., Islam, K. Z., Islam, M. A., Hassan, M. M., Ahmed, Z., & Hasan, R. (2016). Improvement in drx power saving for non-real-time traffic in lte. *ETRI Journal*, 38(4), 622–633.
- 25 Ahmed, A., Amin, B. R., Islam, K. Z., & Islam, S. M. A. (2014). Optimal design of power system stabilizer for multi-machine power system using differential evolution algorithm. *Journal of Electrical Engineering, the Institution of Engineers*, 40, 5.



Conference Proceedings

- 1 Turza, U. R., Das, V. D., Islam, S. H.-U., Pathan, M., Shahriar, M. S., Alam, M. S., ... Rahman, M. M. (2024). Single phase fault detection of induction motor using machine learning approaches. In *2024 IEEE 4th international conference in power engineering applications (icpea)* (pp. 122–127). [doi:10.1109/ICPEA60617.2024.10498946](https://doi.org/10.1109/ICPEA60617.2024.10498946)
- 2 Zardar, M. A., Shafiqullah, M., Nadia, A., Hossain, M. S., Islam, K. Z., & Islam, M. A. (2023). Backtracking search algorithm for microgrid energy scheduling in day ahead market. In *2023 6th international conference on electrical information and communication technology (eict)* (pp. 1–6). IEEE.
- 3 Jahid, A., Islam, K. Z., Hossain, M. S., Monju, M. K. H., & Rahman, M. F. (2019). Performance evaluation of cloud radio access network with hybrid power supplies. In *2019 international conference on sustainable technologies for industry 4.0 (sti)* (pp. 1–5). IEEE.
- 4 Al-Amin, M. R., Chowdhury, S. S., & Islam, K. Z. (2015). Design and simulation of an edge-coupled band pass filter at x band. In *IEEE international conference on materials, electronics & information engineering (icmeie), rajshahi* (pp. 5–6).
- 5 T Kawser, M., M. R. Al-Amin, I. K., Z., & E. Mohammad, S. (2012). Radio access network requirement for new deployment of wimax in dhaka. In *International conference on electrical engineering and computer science*.

Public Knowledge Sharing Report





- 1 Lund, C., Dawood, F., Islam, K. Z., Shafiqullah, G., Anda, M., & Bahri, P. (2023). Renewable energy standalone microgrid feasibility study. Murdoch University.

Languages


Bengali  Mother tongue
English  Good User (PTE score Overall: 66, IELTS score Overall: 7)

Miscellaneous Experience

Scholarships

2021  **International Tuition Fee Scholarship (ITFS)**, For PhD in Information Technology.
 **Murdoch Strategic Scholarship**, For PhD in Information Technology.
2008  **OIC Merit Scholarship**, For Bachelor of Science at Islamic University of Technology.
2005, 2007  **Dhaka Board Scholarship**. Awarded by Education Board Bangladesh.


Professional Membership


2014 – Present  Member, Institute of Electrical and Electronic Engineers (IEEE).

References

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Curriculum Vitae of Md Sanwar Hossain

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- General INFORMATION** : **Ph.D. Researcher**
School of Electrical, Computer and Telecommunications Engineering
Faculty of Engineering & Information Sciences
University of Wollongong (UOW), NSW 2522, Australia
-
- RESEARCH INTERESTS** : Renewable Energy, Smart Grids, Solid State Transformer, Internet of Things (IoT).
-
- EDUCATION** : **M. Sc. in Electrical, Electronic, and Communication Engineering (EECE)** (June 2021)
 - **Institute:** Bangladesh University of Professionals (BUP)
 - **Dissertation:** Development of Energy Efficient Hybrid Power System for Green Cellular Base Stations
 - **Supervisor:** Dr. Md. Fayzur Rahman**B. Sc. in Electrical, and Electronic Engineering (EEE)** (April 2010)
 - **Institute:** Rajshahi University of Engineering and Technology (RUET)
 - **Dissertation:** Effect of Load Change on Frequency and Terminal Voltage in Automatic Generation Control
 - **Supervisor:** Dr. Md. Mortuza Ali
-
- WORK EXPERIENCE** : **Causal Lecturer** (July 2023 – Present)
School of Electrical, Computer and Telecommunications Engineering
University of Wollongong (UOW), NSW 2522, Australia
- Assistant Professor** (June 2015 – Present)
Department of Electrical and Electronic Engineering (EEE)
Bangladesh University of Business and Technology (BUBT), Dhaka, Bangladesh
- Lecturer** (February 2012 – May 2015)
Department of Electrical and Electronic Engineering (EEE)
Bangladesh University of Business and Technology (BUBT), Dhaka, Bangladesh
- Job Responsibilities:**
- Conducting laboratory sessions, and seminars, in addition to organizing and giving lectures.
 - Preparing and evaluating exam scripts, thesis, and assignments.
 - Working as students' advisor on academic and related matters.

- Attending conferences, seminars, and meetings of the faculty and department.
- Setting undergraduate Capstone Project/Thesis ideas for students and supervising their research works accordingly.
- Contributing to the academic development of the Department as a member of different Departmental committees and sub-committees, such as curriculum revision, question moderation, course distribution committee and research cell, academic planning sub-committee, etc.
- Conceiving ideas, designing simulations, and experimental setups, and carrying out research projects on current issues such as renewable energy, smart grid, and power electronics converters.
- Preparing specialized material references for specified assignments.
- Maintaining inventory of assigned laboratory and suggesting improvement plans for the lab.
- Attending and organizing seminars and workshops of professional scientific societies to exchange ideas with experts of similar research interests.
- Giving research presentations at conferences both nationally and internationally as well as in academic settings.
- Publishing research papers in reputed journals and conferences as recognition of research excellence in relevant fields.
- Working together nationally or internationally with other researchers.
- Enthusiastically looking for and obtaining outside funds, including writing, and submitting research applications to outside funding organizations.

AWARDS : **Annual Research Publication Award** (for 2020)

TRAINING : **Power Generation, Power Systems** (12-17 June 2017)
 - *Achieved from ELCTRONICA VENETA spa,
 3105 Motta di Livenza (Treviso) Italy*

MEMBERSHIP : Graduate Student member of the Institute of Electrical and Electronics Engineers (IEEE), IEEE Industry Applications Society, IEEE Power & Energy Society, and IEE Young Professionals.

REVIEWER : Applied Energy, IEEE Access, CMC-Computers, Materials & Continua, Journal of Engineering and Technological Sciences, Energy & Environment, Indonesian Journal of Electrical Engineering and Computer Science, Concurrency and Computation: Practice and Experience, Intelligent Automation & Soft Computing, Journal of Cleaner Production, Energy and Thermofluids Engineering, Wind Engineering.

SOFTWARE SKILL : MATLAB, Simulink, HOMER, PSCAD, PLECS.

LANGUAGE : • Bengali (Native Proficiency)
• English (Professional Proficiency)

REFERENCES : **Dr. Rabiul Islam**
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PUBLICATIONS : • **Journal Articles (37)**

- [1] **M. S. Hossain**, M. R. Islam, D. Sutanto and K. M. Muttaqi, "Advanced soft magnetic materials for the development of high-frequency magnetic core used in solid-state transformers," *IEEE Transactions on Applied Superconductivity*, vol. 34, no. 8, pp. 1-5, Nov. 2024.
[Online Link]: <https://ieeexplore.ieee.org/document/10683968>
- [2] **M. S. Hossain**, M. Shafiullah, M. S. Shahriar, M. S. Alam, M.I.H. Pathan, M. J. Rana, W. M. Hamanah, "Improvement of low-frequency oscillation damping in power systems using a deep learning technique," *Engineering Applications of Artificial Intelligence, Elsevier*, vol. 137, no. B, pp. 1-13, Nov. 2024.
[Online Link]: <https://www.sciencedirect.com/science/article/pii/S0952197624013344>
- [3] M. A. Sadath, J. Kokinda, D. Lin, **M. S. Hossain**, and Q. Gu, "Porous core fiber with hybrid cladding for ultra-flattened dispersion and low loss propagation of terahertz waves," *Results in Optics*, vol. 15, no. 100646, pp. 1-6, May 2024. [Online Link]: <https://www.sciencedirect.com/science/article/pii/S2666950124000439>
- [4] K. Z. Islam, **M. S. Hossain**, B. M. R. Amin, G. M. Shafiullah, and F. Sohel, "Renewable energy-based energy-efficient off-grid base stations for heterogeneous network," *Energies*, vol. 16, no. 169, Dec. 2022.
[Online Link]: <https://doi.org/10.3390/en16010169>
- [5] **M. S. Hossain**, K. Z. Islam, A. G. Alharbi, M. Shafiullah, M. Islam, and A. Fekih, "Optimal design of a hybrid solar PV/BG-powered heterogeneous network," *Sustainability*, vol. 14, no. 4, pp. 1-30, Feb. 2022.
[Online Link]: <https://doi.org/10.3390/su14042201>
- [6] S. Roya, S. M. T. Ahsanb, N. Mondol, M. M. Hasan, D. Kundu, S. M. Boby, M. Hassan, **M. S. Hossain**, M. R. Islam, M. B. Hossain S. Dhari, and M. A. Hossain, "Comparative investigation into key optoelectronic characteristics of semipolar InGaN blue laser diodes: a strategy to mitigate quantum-confined stark effect," *Results in Physics*, vol. 34, no. 1, pp.1-14, Mar. 2022.
[Online Link]: <https://www.sciencedirect.com/science/article/pii/S2211379722000523>
- [7] M. H. Alsharif, **M. S. Hossain**, A. Jahid, M. A. Khan, B. J. Choi, and S. M. Mostafa, "Milestones of wireless communication networks and technology prospect of next generation (6G)," *Computers, Materials & Continua*, vol. 71, no. 3, pp. 4803-4818, Jan. 2022.
[Online Link]: <https://www.techscience.com/cmc/v71n3/46505>
- [8] L. F. Abdulrazak, M. B. Hossain, M. S. Islam, A. F. Alkhateeb, I. M. Mehedi, S. Roy, **M. S. Hossain**, and M. A. Hossain, "Plasmonic sensor based on microstructure PCF: performance analysis with outside detecting approach," *Optical and Quantum Electronics*, vol. 54, no. 58, pp.1-10, Dec 2021.
[Online Link]: <https://link.springer.com/article/10.1007/s11082-021-03441-6>
- [9] **M. S. Hossain**, A. G Alharbi, K. Z. Islam, and M. R Islam, "Techno-economic analysis of the hybrid solar PV/H/fuel cell based supply scheme for green mobile communication," *Sustainability*, vol. 13, no. 22, p. 12508, Nov. 2021. [Online Link]: <https://doi.org/10.3390/su132212508>
- [10] S. Roy, N. Mondol, **M. S. Hossain**, A. H. Howlader, M. J. Hossain, M. R. Islam, and A. Sarkar, "Key photovoltaic parameters of organohalide lead perovskite quantum dot intermediate band solar cell: a numerical investigation," *Materials Today Communications*, vol. 29, no. 1, pp.1-12, Dec. 21.

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- [12] M. A. Sadath, M. M. Rahman, M. S. Islam, **M. S. Hossain**, and M. Faisal, "Design optimization of suspended core photonic crystal fiber for polarization maintaining applications", *Optical Fiber Technology*, vol. 65, no. 102613, pp. 1-7, Jun. 2021. [Online Link]: <https://www.sciencedirect.com/science/article/abs/pii/S1068520021001620>
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- [14] A. Nadia, **M. S. Hossain**, M. M. Hasan, K. Z. Islam., and S. Miah, "Quantifying TRM by modified DCQ load flow method," *European Journal of Electrical Engineering*, vol. 23, no. 2, pp. 157-163, Apr. 2021. [Online Link]: <https://www.iieta.org/journals/ejee/paper/10.18280/ejee.230210>
- [15] M. B. Hossain, M. A. Kabir, M. M. Rahman, S. Roy, L. F. Abdulrazak, **M. S. Hossain**, N. Mondol, M. H. Rahman, K. Z. Islam, and M. I. Pathan, "Hybrid structure based high performance SPR sensor: a numerical approach of structure optimization for DNA hybridization," *Optical and Quantum Electronics*, vol. 53, no. 24, pp. 1-19, Jan. 2021. [Online Link]: <https://link.springer.com/article/10.1007/s11082-020-02650-9>
- [16] K. Z. Islam, M. A. A. Ahasan, **M. S. Hossain**, M. H. Rahman, U. S. Mousumi, and M. Asaduzzaman, "A smart fluorescent light spectroscope to identify the pork adulteration for halal authentication," *Food and Nutrition Sciences*, vol. 12, no. 1, pp. 73-89, Jan. 2021. [Online Link]: <https://www.scirp.org/journal/paperinformation?paperid=106851>
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- [20] M. A. Sadath, M. S. Islam, **M. S. Hossain**, and M. Faisal, "Ultra-high birefringent low loss suspended elliptical core photonic crystal fiber for terahertz applications," *Applied Optics*, vol. 59, no. 30, pp. 9385-9392, Oct. 2020. [Online Link]: <https://www.osapublishing.org/ao/abstract.cfm?uri=ao-59-30-9385>
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- [25] **M. S. Hossain**, and M.F. Rahman, “Hybrid solar PV/biomass powered energy efficient remote cellular base stations,” *International Journal of Renewable Energy Research (IJRER)*, vol. 10, no. 1, pp. 329–342, Mar. 2020. [Online Link]: <https://www.ijrer.org/ijrer/index.php/ijrer/article/view/10542>
- [26] A. Baul, M. B. Hossain, M. N. Sakib, M. M. Rana, M. A. Hossain, **M. S. Hossain**, M. M. Islam, and I. S. Amiri, “High birefringence and negative dispersion based modified decagonal photonic crystal fibers: a numerical study,” *Journal of Optical Communications*, vol. 1, pp. 1-11, Mar. 2020. [Online Link]: <https://www.degruyter.com/document/doi/10.1515/joc-2020-0015/html>
- [27] **M. S. Hossain**, A. Jahid, K. Z. Islam and M. F. Rahman, “Solar PV and biomass resources based sustainable energy supply for off-grid cellular base stations,” *IEEE Access*, vol. 8, pp. 53817-53840, Mar. 2020. [Online Link]: <https://ieeexplore.ieee.org/document/9022971>
- [28] A. Jahid, **M. S. Hossain**, M. K. H. Monju, M. F. Rahman and M. F. Hossain, “Techno-economic and energy efficiency analysis of optimal power supply solutions for green cellular base stations,” *IEEE Access*, vol. 8, pp. 43776-43795, Feb. 2020. [Online Link]: <https://ieeexplore.ieee.org/document/8990070>
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- **Book Chapter (1)**

- [1] M. I. H. Pathan, M. S. Shahriar, M. M. Rahman, **M. S. Hossain**, N. Awatif, and M. Shafiullah, "Comparative analysis of machine learning approaches in enhancing power system stability," *Artificial Intelligence-based Smart Power Systems*, Wiley-IEEE Press, Ch. 9, pp.157-177, Dec. 2022.
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PERSONAL INFORMATION

- **Name:** Dr. Mohammad Rashidul Hassan
- **Father's Name:** Late Alhaj M.A. Khaleque
- **Mother's Name:** Late Aklima Begum
- **Permanent Address:** Khaleque Lodge, 4 Roy Para Road, Dolekhola, Khulna, Bangladesh
- **Present Address:** Kapotakkho Shan Villa, Flat # A-6, H # 5, B-2, Road-1, Dhaka-1205, Bangladesh
- **Date of Birth:** January 3, 1958
- **Nationality:** Bangladeshi by birth

CURRENT POSITIONS

- **Visiting Professor of Respiratory Medicine,** Anwer Khan Modern Medical College, Dhaka, Bangladesh
- **Chairman,** Ingenious Health Care Limited

IMMEDIATE PAST POSITION

- **Director & Professor,** National Institute of Diseases of the Chest and Hospital (NIDCH), Dhaka, Bangladesh
- **Past President,** Bangladesh Lung Foundation

PROFILE

A pioneer in respiratory medicine in Bangladesh with over 35 years of medical leadership and contributions, including the development of asthma management, fiber-optic bronchoscopy, and multi-drug resistant (MDR) tuberculosis treatment in Bangladesh. Key accomplishments include:

- Founder of Bangladesh Asthma Association and Bangladesh Lung Foundation
- Established the 175-bed National Asthma Center in Bangladesh
- Introduced Radiofrequency Ablation Therapy (RFT) for lung cancer treatment
- Led research initiatives on respiratory health, asthma, and tuberculosis

AREAS OF EXPERTISE

- Management of TB, MDR-TB, asthma, and chronic respiratory diseases
- Fiber-optic bronchoscopy and video bronchoscopy procedures
- Postgraduate education and practical training for medical students

- Clinical research, including asthma, COPD, and lung cancer treatments
 - Patient education and community outreach for respiratory diseases
-

PROFESSIONAL INTERESTS

- First Radiofrequency Ablation (RFA) surgeon in Bangladesh, having performed over 500 procedures
 - Developer of the Center of Excellence for Bronchial Asthma and COPD patients
 - Trainer and pioneer of Fiber-optic Bronchoscopy in Bangladesh
 - Advocate for the importance of patient education programs in chronic care
-

EDUCATION

- **Doctor of Medicine (M.D.)** in Chest Diseases, National Institute of Diseases of the Chest and Hospital, Dhaka, Bangladesh, July 1995
 - **Fellow of College of Physicians & Surgeons (FCPS)** in Medicine, Bangladesh College of Physicians and Surgeons, Dhaka, January 1990
 - **Member of College of Physicians & Surgeons (MCPS)** in Medicine, Bangladesh College of Physicians and Surgeons, Dhaka, January 1988
 - **Bachelor of Medicine & Surgery (MBBS)**, Chittagong Medical College, Chittagong, Bangladesh, September 1982
-

PROFESSIONAL LICENSURE

- **Registered Medical Practitioner** (BMDC Reg. # A12348), Bangladesh Medical & Dental Council, June 1984
-

HOSPITAL RESIDENCY

- Completed one-year rotational internship at Chittagong Medical College Hospital, Bangladesh (March 1983 – March 1984)
-

POSTGRADUATE TRAINING

1. **Assistant Registrar**, Sher-e-Bangla Medical College Hospital, Barisal, Bangladesh, 1986-1988
 2. **Residential Physician**, Sher-e-Bangla Medical College Hospital, Barisal, Bangladesh, 1990-1992
-

RESEARCH AND PUBLICATIONS

Dr. Hassan has authored over 60 scientific papers and has participated in numerous international conferences, contributing to the advancement of respiratory medicine globally.

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