

American International University-Bangladesh (AIUB)

**Department of Computer Science**

**Faculty of Science & Technology (FST)**

**Research Methodology**

**Assignment**

Submitted By

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| **Semester: Summer\_2023-2024 FINAL TERM** | | | | **Section:** | **Group No:** |
| SL | SN | Student Name | Student ID | Individual  Contribution (100%) | Total Marks: 40 |
| Earned Marks: |
| **A** | 09 | Md. Shohanur Rahman Shohan | 22-46013-1 | 32% |  |
| **B** | 29 | Farjana Yesmin Opi | 22-47018-1 | 30% |  |
| **C** | 30 | Md. Abu Towsif | 22-47019-1 | 38% |  |
| **D** |  |  |  |  |  |

Submission Date: 19th February 2024

**The assignment will be Evaluated for the following Course Outcomes**

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| CO1: *Evaluate* all relevant resources for designing a computer science and engineering solution and determine the level of novelty of the research. | Total Marks (9) |
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| **Problem Analysis and use of State-of-the-Art** **Resources:** Discuss the research problem background with best use of state‐of‐art literature, resources, and technologies to produce a significant result that is likely to have a major impact. | [3 Marks] **A: B: C: D:** |
| **Critical Reflection and Creativity in Research Objective:** Deep insight demonstrated and presented a creative solution to the real‐life problem. And Results are critically confronted with various existing literature | [3 Marks] **A: B: C: D:** |
| **Novelty and Contribution of the Research:** Elaborately discuss and identify the contribution of the research to the development of scientific concepts by recognizing the research gaps of existing research and developments. | [3 Marks] **A: B: C: D:** |

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| CO2: *Analyze* the collected data to provide valid solution of the research problem acknowledging the limitations. | Total Marks (9) |
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| **Data Analysis:** Elaborately discuss the research method, its appropriateness and details on data collection, analysis, and synthesis for proposing valid solution to the research problem. | [3 Marks]  **A: B: C: D:** |
| **Solution and Validation:** Elaborately discuss the solution of the research problem by establish a direct connection between proposed solutions with the research objective based on the collected research data. | [3 Marks]  **A: B: C: D:** |
| **Limitation and Scope of Future Studies:** Elaborately discuss abstract and concluding remarks of the research with its limitations and scope of future studies. | [3 Marks]  **A: B:  C: D:** |

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| CO3: Determine and Demonstrate professional codes of ethics and standard in conducting research considering public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability. | Total Marks (9) |
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| **Free of Plagiarism, Data Falsification Citations and References:** Submit plagiarism free research paper (similarity index is <10%). In-text citations and reference list citations were complete and properly formatted in APA or any other standard style. The Research data is not fabricated or altered intentionally to fit into the predetermined research findings. Materials are properly cited and referenced if they are taken from other sources. And not attributed to a source from which it has not been obtained *(i.e., false citation)* | [3 Marks]  **A: B: C: D:** |
| **Professional codes of ethics and standard:** The research elaborately demonstrates professional codes of ethics and standard in conducting research considering public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability. | [3 Marks]  **A: B: C: D:** |
| **Formatting and Submission:** Submitted in due time, the report is complete and there are no errors in spelling, format, and grammar. Consistently  presents a logical and effective organization. | [3 Marks]  **A: B: C: D:** |

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| CO4: *Defend* the research solutions based on complex engineering activities by delivering an effective presentation to the audience. | Total Marks (9) |
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| **Presentation delivery (eye contact and body language):** Keeps eye contact with audience all the time, use natural gestures and movements, looks confident. | [3 Marks]  **A: B: C: D:** |
| **Enthusiasm/Audience Awareness:** Demonstrate strong enthusiasm about the topic, significantly increases audience understanding and knowledge of the topic, convinces an audience to recognize the validity and importance of the subject. | [3 Marks]  **A: B: C: D:** |
| **Creativity and Use of Media:** The presentation was creative in design and effectively use multimedia. | [3 Marks]  **A: B: C: D:** |

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| Viva/Defense | Total Marks (4) |
| Defend the research in performance in the question/answer session. | **A: B: C: D:** |

Designing an Intelligent Accommodation System for Rohingya Refugees: Integrating AI, Sustainability, and Economic Empowerment

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**Abstract**

This paper presents a framework for an intelligent accommodation system aimed at enhancing living conditions, security, and economic opportunities for Rohingya refugees. Through a systematic literature review (SLR), the study identifies challenges and proposes an AI-driven model with sustainable infrastructure and community-focused strategies. The framework seeks to improve resource management, security, and productivity within refugee camps, addressing both immediate and long-term needs. Findings highlight the potential of integrating technology and local knowledge to promote self-sufficiency and stability, offering valuable insights for policymakers and humanitarian organizations.

**Keywords:** Sustainable Refugee Housing, AI-Driven Solutions, Rohingya Refugee Accommodation, Refugee Productivity, Economic Empowerment

INTRODUCTION

**Problem Background**

The Rohingya, persecuted from Myanmar, face severe displacement, with about 1,000,000 refugees in Bangladeshi camps (United Nations High Commissioner for Refugees, n.d.). Innovative solutions are needed for accommodation and self-sufficiency (Milton et al., 2017). The influx in Cox’s Bazar strains resources, and traditional camps provide immediate relief but often overlook long-term sustainability and economic potential (Bhatia et al., 2018). Tasmin, a 51-year-old Rohingya woman, fled Myanmar in 2017 after extreme violence, journeying for eleven days before crossing the Naf River into Bangladesh. Her family joined nearly one million refugees in Kutupalong, facing overcrowded conditions, inadequate shelter, and food shortages (Relief International, 2019). This story highlights the trauma and challenges many refugees experience in the camps.

Moreover, crimes such as murders and drug offenses, linked to groups like ARSA and RSO, have surged in the camps (The Daily Star, 2023). The situation is worsened by Rohingya refugees using fake Bangladeshi IDs, causing instability and fear (Dhaka Tribune, 2023). Contributing factors include limited economic opportunities and hopelessness, leading jobless youths to crime, with armed groups fueling illegal activities and escalating violence (Dhaka Tribune, 2023). The problems that this research aims to address can be broadly summarized into two main issues:

* **Inadequate living conditions and lack of long-term sustainability**: Current refugee accommodations hinder the economic self-sufficiency and social productivity of Rohingya refugees.
* **Escalating security problems within camps**: Issues such as crime and the misuse of identification documents further destabilize the already precarious environment.

This paper addresses the critical need to rethink refugee accommodation from a perspective that includes productivity, self-reliance, and enhanced security.

**Related Studies**

In order to address the above discussed problems several studies examined conditions of Rohingya refugee camps. Bhatia et al. (2018) highlight inadequate facilities and economic opportunities but offer no long-term solutions. Milton et al. (2017) focus on health challenges from overcrowding and poor sanitation but overlook socio-economic factors and technology's role. Karin et al. (2020) emphasizes the critical dearth of food, inadequate housing facilities, and poor access to health services in Rohingya refugee camps but do not explore the potential role of technological advancements in addressing these issues. Hossain et al. (2020) address rising crime and armed groups but do not explore how AI could enhance security.

Despite existing research, there is a gap in integrating sustainable living conditions with productivity and advanced technologies like AI. Current studies do not fully address the need for a holistic system that meets basic needs while fostering economic self-sufficiency and social productivity. This research aims to bridge this gap by proposing an AI-driven accommodation system to optimize resources, enhance security, and support economic integration in refugee camps. This study will significantly advance humanitarian aid and refugee studies, offering a globally adaptable model.

**Research Objectives**

This research proposes an intelligent accommodation system for Rohingya refugees, integrating sustainable living, productivity, and security. It aims to address immediate needs like shelter and healthcare while focusing on long-term sustainability through environmental practices and resource management. The system will promote self-reliance through economic activities and use AI for security and resource optimization. The study will present a model to answer: "How to develop an intelligent accommodation system for Rohingya refugee that supports productivity, ensures security, and leverages AI?"

**Research Contributions**

This study contributes to humanitarian aid and AI-driven social innovation by proposing a framework for intelligent accommodation systems for Rohingya refugees. It provides actionable insights for policymakers and organizations to use AI for secure, sustainable environments that boost productivity, reduce dependency, and alleviate the socio-economic burden on host countries.

methodology

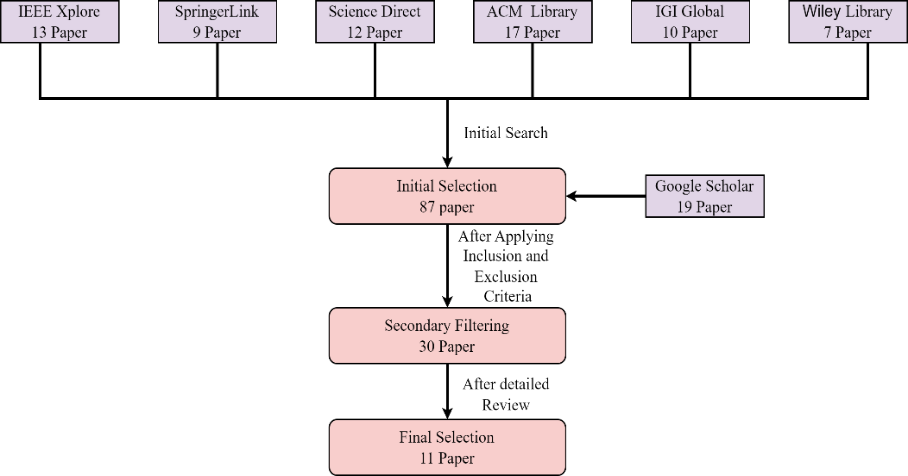
This study employs a systematic literature review (SLR) to evaluate research on intelligent accommodation systems for Rohingya refugees, ensuring a thorough and unbiased data collection (Kitchenham et al., 2010; Petersen et al., 2008). The SLR method was chosen for its comprehensive approach and ability to form a robust framework by systematically analyzing relevant literature.

#### Search Strategy

The search strategy focused on key databases such as IEEE Xplore, SpringerLink, ScienceDirect, ACM Digital Library, IGI Global, Google Scholar, and Wiley Online Library, ensuring broad coverage of technological and humanitarian literature. Keywords and Boolean operators, including "Rohingya refugees" AND "accommodation system" AND "artificial intelligence," and "AI in refugee security" AND "systematic review," refined the search. Forward and backward citation techniques were used to review references and identify recent studies. Inclusion criteria emphasized peer-reviewed journal articles and conference papers published in English between 2000 and 2024, addressing refugee accommodation, AI applications, and security. Exclusion criteria removed non-peer-reviewed materials, studies not directly related to AI or refugee accommodation systems, and articles lacking substantive content or methodological rigor.

#### Selection Process

The selection process involved systematically screening studies for relevance to the research question. Initial database searches identified 87 articles, which were then reviewed for their relevance to AI, refugee accommodation, and security. Applying inclusion and exclusion criteria reduced the list to 30 articles by filtering out those lacking peer-reviewed rigor or relevance. A detailed review of these 30 articles led to the final selection of 11 studies, chosen for their direct relevance and methodological rigor, including both full texts and abstracts.



**Figure 1 -** Literature Search and Article Selection for Systematic Review

#### Data Extraction and Synthesis

Data extraction utilized a standardized approach to gather detailed information from all accessible sections of freely available articles and key data from restricted-access papers. A standardized form was used to systematically extract data from abstracts, methodology, results, and conclusions of fully accessible studies, while focusing on critical information from articles with limited access. Quality assessment was based on citation count, journal impact, and methodological rigor, ensuring the inclusion of high-quality studies and enhancing the credibility and impact of the research findings.

results and analysis

**Research Data/Results**

The following table summarizes the key findings from the reviewed literature, highlighting relevant insights and data that inform the development and validation of the proposed solution

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| Top row contains citations with author name, while the rows below the citation contains findings from the reviewed literature |
| **Alam et al. (2018)** |
| The study proposes a cloud-based system to improve refugee accommodation management by centralizing resource tracking and refugee information. Biometric identification enhances security and resource allocation, creating a more efficient and productive environment. |
| **Wardeh and Marques (2021)** |
| The review highlights the importance of sustainable planning in refugee camps by integrating local knowledge and technology. Focus areas include health, education, and economic growth, with long-term policies crucial for improving the Rohingya community's quality of life. |
| **Dala et al. (2018)** |
| The paper calls for improved refugee shelter design by integrating urban planning to boost productivity and security. It critiques rigid bureaucratic systems, advocating for more flexible, self-determined living arrangements to empower refugees, especially the Rohingya. |
| **Sabie and Ahmed. (2019)** |
| The paper highlights the need for inclusive technology design to overcome barriers faced by refugees, especially women. An intelligent accommodation system could address these challenges, improving resource access, digital skills, and security for Rohingya refugees. |
| **Marji and Kohout (2022)** |
| The paper advocates for using AI in refugee camps to improve spatial organization, enhance living conditions, and ensure security through better resource management. Involving refugees in the design process fosters more sustainable and productive accommodation solutions. |
| **Hossain et al. (2020)** |
| The paper emphasizes a structured approach to the Rohingya refugee crisis, focusing on security and safe return while addressing vulnerabilities and resource limitations. It suggests that an intelligent accommodation system could enhance productivity and security, highlighting the need for international cooperation and humanitarian support to ensure sustainability. |
| **Easen and Binatli (2017)** |
| The paper highlights how the influx of refugees, like Syrians in Turkey, affects local labor markets by increasing unemployment. It emphasizes the need for integration strategies to enhance productivity and security, guiding the development of an intelligent accommodation system for Rohingya refugees to stabilize labor markets and ensure secure living conditions. |
| **İncetahtacı (2024)** |
| The paper stresses the need for structured solutions to the Rohingya crisis, focusing on security, safe return, and international cooperation. It suggests an intelligent accommodation system to enhance productivity and address security concerns. |
| **Georgious et al. (2023)** |
| The paper highlights how refugee influxes, like Syrians in Turkey, affect local labor markets, underscoring the importance of integration strategies. These insights can inform the development of secure and productive accommodation systems for Rohingya refugees. |
| **Filipski et al. (2020)** |
| The study emphasizes the need for addressing legal, resource, and cultural barriers to improve refugee youth productivity. Collaborations between universities and NGOs can empower refugees, enhancing their economic contributions and social cohesion. |
| **Wolf (2014)** |
| The paper identifies the Rohingya crisis as a non-traditional security threat in Bangladesh, fueling religious fundamentalism and straining governance. Addressing transnational crime and distinguishing between moderate and radical elements is essential for regional stability. |

**Analysis and Discussion**

Based on the above findings from the selected papers, the proposed solution integrates an AI-driven system for resource tracking, identification, and security. It enhances refugee living conditions with sustainable infrastructure and promotes self-sufficiency through employment and community integration within the camps.The proposed solution integrates an AI-driven system to enhance resource management, security, and living conditions for Rohingya refugees. By utilizing AI for centralized data management and biometric identification, as suggested by Alam et al. (2018), the system will improve resource tracking and security. It also aims to foster self-sufficiency through sustainable infrastructure and eco-friendly practices, such as solar power, and by creating employment opportunities within camps (İncetahtacı, 2024; Filipski et al., 2020). This approach will not only improve living conditions but also promote economic integration and community cohesion.

Additionally, the proposed solution incorporates AI-based surveillance and real-time monitoring to bolster security and ensure safety (Hossain et al., 2020). By integrating refugees into local economies and addressing legal and cultural barriers through education and mentorship programs, the system will support both the refugees and host communities. This comprehensive approach aims to provide a holistic solution that addresses immediate needs, enhances productivity, and fosters long-term stability within the camps.

The diagram below illustrates the proposed solution, integrating key technological and community-focused strategies based on the proposed solutions

A diagram of a process

Description automatically generated

**Figure 2** - Diagram of Proposed AI driven accommodation system for Rohingya refugees

The proposed intelligent accommodation system enhances refugee support through AI-driven resource management, spatial organization, and sustainable infrastructure. Marji and Kohout (2022) demonstrate AI’s effectiveness in optimizing camp layouts and resource management, aligning with our system's objectives. İncetahtacı (2024) emphasizes economic empowerment, supporting the system’s potential to boost productivity and self-reliance. These studies confirm the system’s effectiveness in bridging gaps in current refugee accommodation.

Conclusion

This paper presents a framework for an intelligent accommodation system to improve the living conditions, security, and economic opportunities for Rohingya refugees. By integrating AI-driven systems with sustainable infrastructure, the solution focuses on both immediate relief and long-term self-sufficiency, based on a comprehensive literature review.

While the framework offers a strong theoretical model, it remains conceptual and lacks real-world testing. Future research should explore its practical implementation, scalability, and adaptability to ensure its effectiveness in various refugee contexts.

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