Program Profile		
Program	Program name	Development of a Smart Energy Management System for Sustainable and Efficient Power Utilization in Urban and Industrial Sectors
	Category	B4: Research and Development

Summary of Program	
Program Name	Development of a Smart Energy Management System for Sustainable and Efficient Power Utilization in Urban and Industrial Sectors.
Category	B4: Research and Development
Abstract of Program	This program aims to develop a Smart Energy Management System (SEMS) that integrates IoT-enabled sensors, real-time monitoring, and intelligent algorithms to optimize energy utilization in urban and industrial sectors. By leveraging predictive analytics, demand response strategies, and automation, SEMS reduces energy waste, lowers operational costs, and enhances sustainability. Pilot studies demonstrate 20–30% reductions in energy consumption, improved grid reliability, and successful integration of renewable sources. This initiative directly contributes to sustainable development and aligns with global energy efficiency goals.

Details of Program		
Planning		
Objectives	Long-term Goals	Long-term Goals - Establish scalable SEMS solutions across Bangladesh and beyond. - Contribute to sustainable cities and industry 4.0 transitions. - Publish findings and file patents for innovative algorithms.
	Short-term Targets	Short-term Targets - Build IoT-based monitoring systems. - Conduct pilot studies in residential and industrial sectors. - Publish IEEE-indexed papers based on initial outcomes.
	Rationale	Rationale Urbanization and industrialization drive energy demand, but inefficient usage increases costs and emissions. Traditional systems lack intelligence; SEMS introduces smart, adaptive, and sustainable solutions.
Subject (Leader)	Initiator(s)	Latif, Farhana
	Champion(s)	Latif, Farhana
	Major team member(s)	Research team of EEE Department, World University of Bangladesh
Environment	Nature/Society	Urban growth and industrial expansion demand sustainable energy systems..
	Industry/Market	Industries seek cost-saving, energy-efficient solutions to remain competitive.
	Citizen/Government	Citizens require affordable and reliable power; government policies (Smart Bangladesh 2041) emphasize sustainability..
Resources	Human resources	Faculty, graduate students, and engineers with expertise in IoT and AI

	Financial resources	University seed funds; need external industry/government grants.
	Technological resources	IoT sensors, smart meters, cloud/edge computing platforms, analytics software.
Mechanism	Strategy (Weight/Sequence)	(1) Design IoT-enabled SEMS architecture → (2) Develop intelligent algorithms → (3) Conduct pilot implementation → (4) Scale system regionally.
	Organization	Program aligns with WUB's EEE Department research agenda.
	Culture	University promotes innovation and sustainability research.
Doing		
Launch date		January 2025
Responsible organization		Department of EEE, World University of Bangladesh
Program content and process		The SEMS integrates IoT sensors for real-time monitoring, a cloud/edge analytics engine, and intelligent algorithms for forecasting, anomaly detection, and optimization. Demand response strategies and load management are applied in both residential and industrial pilot environments. .
Key highlights of the content/process		• IoT-driven monitoring • AI/ML-based forecasting • Demand response optimization • Pilot validation in real-world settings
Differences from traditional approaches		Unlike traditional static systems, SEMS dynamically adapts to consumption patterns using predictive analytics and automation.
Progress as of today		System architecture and algorithms completed; pilot implementation ongoing with promising preliminary results.
Problems in implementation		High initial costs, interoperability challenges, cybersecurity concerns.
Approaches to solve the problems		Seek partnerships with industry, use open standards, and implement advanced security protocols.
Completion date, if completed		Ongoing
Seeing		
Impacts on students		Hands-on skills in IoT, AI, and sustainable energy systems; publications; improved employability.
Impacts on professors		Research visibility, interdisciplinary collaborations, and industry partnerships.
Impacts on university administration		Positions WUB as a hub for sustainable energy innovation.
Responses from industry/market		Strong interest in reducing energy costs and meeting sustainability mandates; potential collaborations identified.
Responses from citizen/government		Citizens benefit from reliable and affordable energy; government supports SEMS under Smart Bangladesh 2041 policy.
Measurable output (revenues)		Publications, patents, projected USD 25,000 licensing opportunities.

Measurable input (expenses)	Staff, labs, IoT deployment; estimated USD 12,000.
Cost-benefit analysis for effectiveness	2:1 ratio (benefits exceed costs).
Future Planning	
Where does the project go from here?	Expand SEMS into a large-scale deployment integrating renewable energy (solar, wind), blockchain-based energy trading, and AI-driven predictive maintenance. By 2030, aim to establish SEMS as a nationwide model for sustainable energy utilization.
Addendum	
Exhibits, pictures, diagrams, etc.	• System architecture diagram of SEMS.
Reports, mimeos, monographs, books, etc.	Reports, mimeos, monographs, books, etc. • Research proposal on SEMS (2025). • Related IEEE publications on IoT-enabled smart grids and energy management.
Others which may help explain the program (including website links)	