

Q8	Are the third-party data used from an open source?		X
Q9	Are the third-party data used from a different research group?	X	
Q10	If the answer to Q9 is “Yes”, do you have the approval to use third-party data sets? Attach the proof to PSQ application.		X

If the answer is “Yes” to Q5, please answer the following questions:

		Yes	No
Q11	Have you signed an MOU between the parties [If Yes, attach the proof to PSQ application.]		
Q12	Will there be a chance for any conflict of interest between the parties? [If Yes, provide details of the issue and your plan to solve it]		

<b>Student proposed?</b>	Y/N	N
<b>ID:</b>	<b>SC-06</b>	
<b>SUPERVISOR:</b>	<b>SUNETRA CHOWDHURY</b>	
<b>TITLE:</b>	<b>INTELLIGENT ENERGY MANAGEMENT SCHEME OF A HYBRID MICROGRID USING MACHINE LEARNING TECHNIQUES</b>	
<b>DESCRIPTION:</b>	This project deals with the design of an intelligent energy management scheme for a hybrid microgrid using machine learning techniques. The microgrid must not have more than 1MW generation. The microgrid should be able to operate in both islanded and grid-tied modes. It should be able to provide uninterrupted and quality power to its own loads and must also be able to exchange power with the utility if there is excess generation. The EMS should be designed to match the generation and load demand on the microgrid under both islanded and grid-tied operation. It should also be able to control charging and discharging of the battery or to execute load shedding during a drastic generation shortfall. The aim of the scheme will be to maintain power quality at the load terminals under all operating conditions.	
<b>DELIVERABLES:</b>	i) Review of hybrid microgrid energy management and intelligent energy management algorithms. ii) Design and simulation of test microgrid, loads and the intelligent energy management scheme. All design steps should be clearly shown. iii) Testing and validation of the performance of the scheme for various modes of operation and loading/resource availability conditions. iv) Interpretation of results and conclusions.	
<b>SKILLS/REQUIREMENTS:</b>	Preferred courses : 4th Year power and machine courses Software : Matlab, DigSILENT Powerfactory	

<b>GA 1: Problem solving:</b> <i>Identify, formulate, analyse and solve complex* engineering problems creatively and innovatively</i>	The problem is open-ended and complex because it does not specify the type of load profile and the type of machine learning energy management algorithm. These are to be decided by the student to address the research topic.
<b>GA 4**:</b> Investigations, experiments and analysis: <i>Demonstrate competence to design and conduct investigations and experiments.</i>	i) Collecting data for developing the load profile. ii) Selecting the simulation software. iii) Collecting/preparing data to simulate a realistic battery-powered uninterrupted power supply. iv) Simulating an integrated system model with the battery, controller, and loads. iv) Testing the system and controller for various load profiles and operational scenarios. v) Cost analysis of the overall system. vi) Interpretation of results and conclusions.
<b>EXTRA INFORMATION:</b>	Data collection should be from open sources. If any data is assumed, the assumptions must be clearly explained.
<b>BROAD Research Area:</b>	Microgrids, Machine Learning
<b>Project suitable for ME/</b>	EE, ME
<b>ECE/EE/ALL?</b>	

**\*NOTE: Complex engineering problems** require in-depth fundamental and specialized engineering knowledge

- and have one or more of the characteristics: are ill-posed, under- or overspecified, or require identification and refinement; are high-level problems including component parts or sub-problems; are unfamiliar or involve infrequently encountered issues; and their solutions have one or more of the characteristics:
- are not obvious, require originality or analysis based on fundamentals; are
  - outside the scope of standards and codes; require information from variety of
  - sources that is complex, abstract or incomplete;
  - involve wide-ranging or conflicting issues: technical, engineering and interested or affected parties.

**\*\*NOTE: GA 4:** The balance of **investigation and experiment** should be appropriate to the discipline. Research methodology to be applied in research or investigation where the student engages with selected knowledge in the research literature of the discipline. An **investigation differs from a design** in that the objective is to produce knowledge and understanding of a phenomenon and a recommended course of action rather than specifying how an artifact could be produced.

#### Ethics clearance questionnaire

		Yes	No
<b>Q1</b>	Does this project involve data collection		X
<b>Q2</b>	Does this project involve utilizing a third-party data set	X	

<b>Q3</b>	Does this project utilize machine learning (ML) or artificial intelligence (AI)?	X	
<b>Q4</b>	Does it exceed the minimum risk defined here: <a href="#">Link</a> [Answer is No here if your project does not utilize ML and AI]		X
<b>Q5</b>	Does this project involve external parties, funders, etc		X

Answer the following questions if you answer "Yes" to any of the above questions. If the answer is "Yes" to **Q1**, please answer the following questions:

		Yes	No
<b>Q6</b>	Are there humans or animals directly involved in the data collection process or contains any identification information		

If the answer is "Yes" to **Q2**, please answer the following questions:

		Yes	No
<b>Q7</b>	Are the third-party data used anonymous (data does not contain human or animal-related information?)	X	
<b>Q8</b>	Are the third-party data used from an open source?		X
<b>Q9</b>	Are the third-party data used from a different research group?	X	
<b>Q10</b>	If the answer to <b>Q9</b> is "Yes", do you have the approval to use third-party data sets? Attach the proof to PSQ application.		X

If the answer is "Yes" to **Q5**, please answer the following questions:

		Yes	No
<b>Q11</b>	Have you signed an MOU between the parties [If Yes, attach the proof to PSQ application.]		
<b>Q12</b>	Will there be a chance for any conflict of interest between the parties? [If Yes, provide details of the issue and your plan to solve it]		

<b>Student proposed?</b>	Y/N	N
<b>ID:</b>	<b>SC-07</b>	
<b>SUPERVISOR:</b>	<b>SUNETRA CHOWDHURY</b>	
<b>TITLE:</b>	<b>DESIGN OF LOSS OF GRID PROTECTION SCHEME FOR A HYBRID RENEWABLE ENERGY SYSTEM INTEGRATED AT SUB-TRANSMISSION OR DISTRIBUTION NETWORK</b>	
<b>DESCRIPTION:</b>	Several voltage and frequency-based Loss of Grid (LOG) protection schemes are currently used to detect and disconnect a renewable power plant during a grid fault, allowing the plant to operate in islanded mode supplying its own loads. This project deals with the design of a suitable LOG scheme for a hybrid renewable energy system (HRES) integrated at sub-transmission or distribution levels in a utility grid. The scheme must operate reliably for both balance and unbalanced grid faults. The scheme must also be tested for various combinations of rotational and static generation.	