

PROPOSED TITLE

"Detect Usage Pattern of devices in Microgrid Environment"

SUBMITTED BY

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ME(E)-MSA-PART 3&4(2021-2022)

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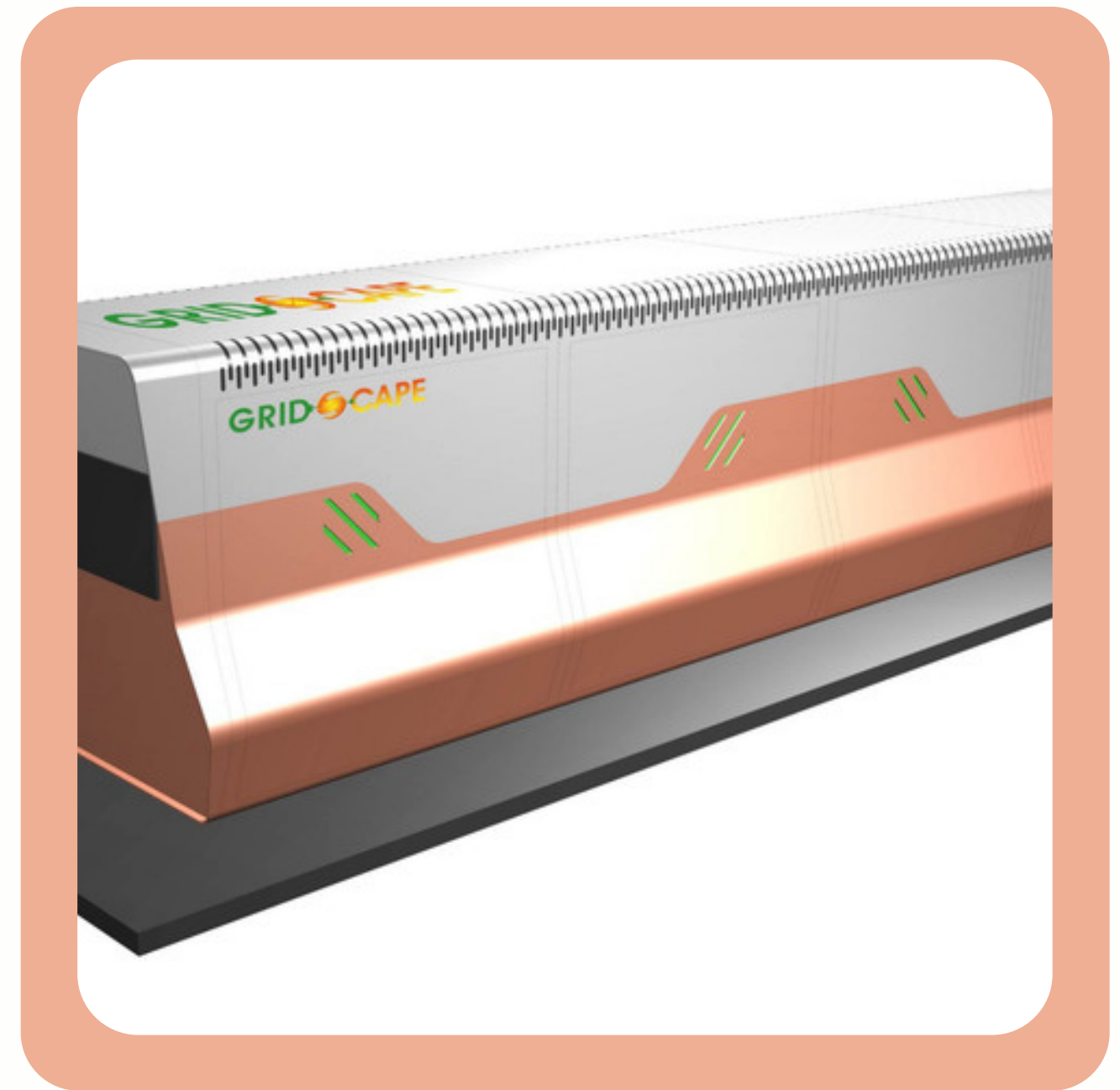




GRIDSCAPE SOLUTIONS



GridScape Solutions is a leading smart energy solutions company that specializes in developing and deploying innovative, standards-compliant products and solutions for renewable Microgrid and EV charging systems.



ABSTRACT



- Modern life has grown to be extremely dependent on Electric Power. Increase of the usage of electrical devices causes higher electricity bills. As the world's services increasing in consumption of energy has highlighted energy crises and environment threats. Various Countries are planning and developing strategies and for this the Microgrids has received a lot of buzz the recent years.
- Detecting power consumption patterns can be used to minimize the electricity bill and provide energy management to the system.
- It is estimated that around 35% of the energy supplied to the devices are wasted, for this we needs to detect electricity consumption patterns of power usage via data mining and clustering using machine learning/Artificial techniques and detect the device.
- A prototype data acquisition device has to be developed to collect power consumption data and transmit them to a central database. Then the analysis is done using AI or ML technique for better performance in real time to detect devices. and record the power consumption of each device to get a detailed power consumption data set. By analyzing this data set, the device is indentified and then the classifications are done to detect patterns of device usage, which provide means to optimize the device handling to minimize the power consumption.



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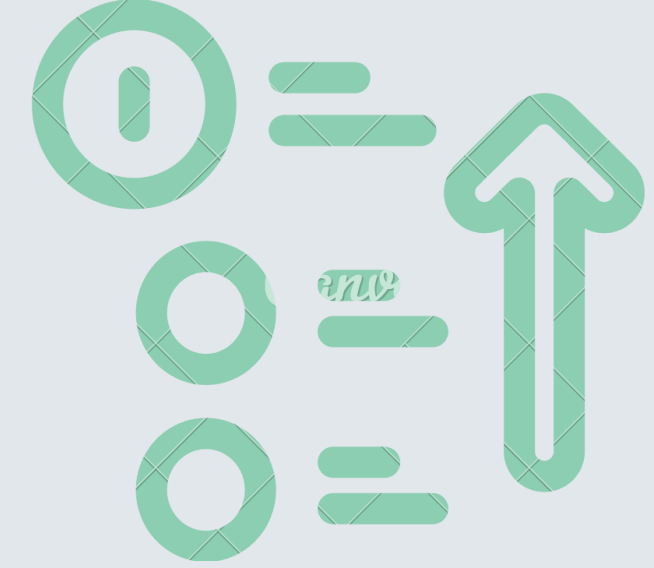
WHAT IS THE MAIN MISSION OF RESEARCH

To help Consumers by providing them with
innovative and effective solutions



Part 1:
Our Main Mission





HOW DO WE GET
THERE?

We prioritise and put in the
work to implement our
strategies.

IMPORTANT!

OUR 2 MAJOR GOALS



**ENERGY
MANAGEMENT**



ENERGY SAVINGS



Part 2:
Our Major Goals

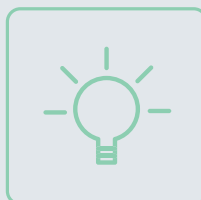


KEY STRATEGIES FOR THE PROJECT

CONCEPTS



Understanding the Concept, Detailed Study and Planning.
This process is initiated by collecting information related to power usage of electrical devices which is used in microgrid environment with the help of previous data usage or we can get this data of individual by NILM (Nonintrusive load monitoring)



Part 3:
Our Key Strategies

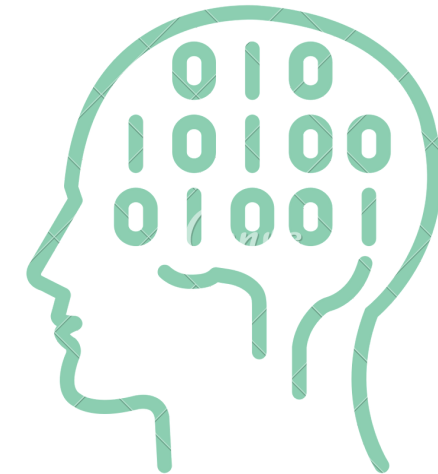


KEY STRATEGIES FOR THE PROJECT

ALGORITHM

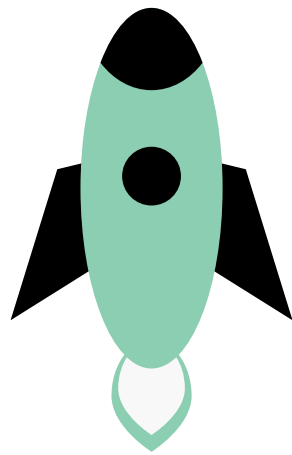


Prototyping and User-Testing
Apply the best method



Part 3:
Our Key Strategies

KEY STRATEGIES FOR THE PROJECT



ASSESS

Design to be ready for the used.
Presenting/Launch

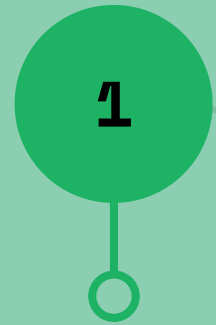


Part 3:
Our Key Strategies



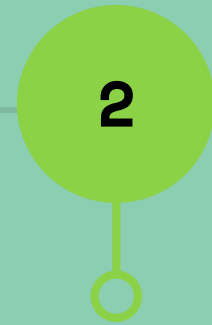


Timeline



**m(9-10) -
2021**

Area of Research,
Detailed learning,
Approval of Project



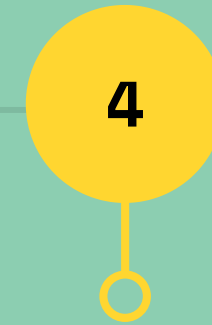
**m(11-12) -
2021**

Initializing,
Collecting Data,
Experiment on a
local



**m(1-2) -
2022**

Making
strategies,
Finalist the
method



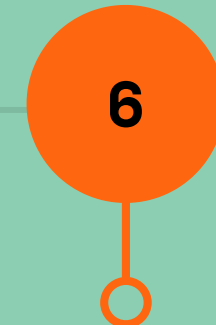
**m(3-4) -
2021**

Coding, Testing
and
Experimenting



**m(5-6) -
2021**

Implement actual
Design, Bugs
Solving



**m(7-8) -
2021**

Implementation
design on actual
sites. Work on
final Report,



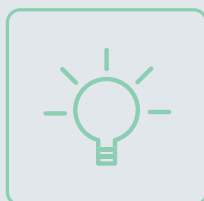
We are here



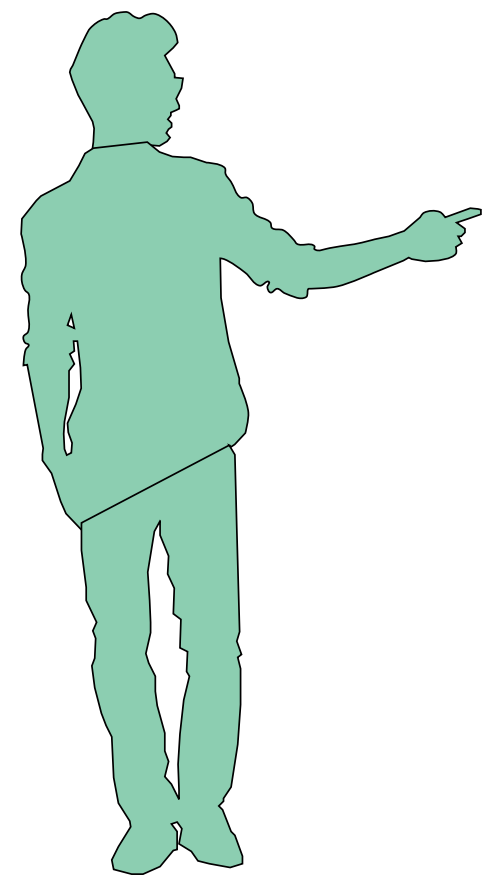
RESOURCES & REFERENCES



1. **"Real Time Identification of Electrical Devices through Power Consumption Pattern Detection"**.
(Conference Paper · March 2016)
(https://www.researchgate.net/publication/308764100_Real_Time_Identification_of_Electrical_Devices_through_Power_Consumption_Pattern_Detection)
2. **"Electricity Consumption Pattern Detection"**
(**Conference Paper** · January 2016)
(https://www.researchgate.net/publication/310813240_Electricity_Consumption_Pattern_Detection)
3. ELSEVIER:-**"Understanding usage patterns of electric kettle and energy saving potential"** (D.M. Murray ↑, J. Liao, L. Stankovic, V. Stankovic) Department of Electronic and Electrical Engineering, University of Strathclyde, 204 George St., Glasgow, United Kingdom(2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)).
4. **"Nonintrusive Load Monitoring Using Wavelet Design and Machine Learning"** (Jessie M. Gillis, Student Member, IEEE, Sami M. Alshareef, Student Member, IEEE, and Walid G. Morsi, Member, IEEE)
5. **"Classification of Household Devices by Electricity Usage Profiles"**. (Jason Lines¹, Anthony Bagnall¹, Patrick Caiger-Smith², and Simon Anderson²,{paddy, simon}@greenenergyoptions.co.uk
<http://www.greenenergyoptions.co.uk>)



Part 4:
Reference



Thank you!



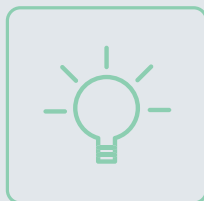
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"Real Time Identification of Electrical Devices through Power Consumption Pattern Detection".

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(https://www.researchgate.net/publication/308764100_Real_Time_Identification_of_Electrical_Devices_through_Power_Consumption_Pattern_Detection)

- This research basically identify electrical devices in real time using intelligent techniques through data analysis.
- Data acquisition system was implemented to extract parameters such as active power, reactive power, phase shift, root mean square voltage and current from the appliances connected to it.
- The analysis is done using neural networks, support vector machines, k-means, mean-shift and silhouette classifiers.



Part 4:
Reference

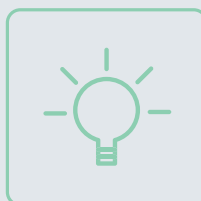


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"Nonintrusive Load Monitoring Using Wavelet Design and Machine Learning"

(Jessie M. Gillis, Student Member, IEEE, Sami M. Alshareef, Student Member, IEEE, and Walid G. Morsi, Member, IEEE)

- This paper is based on wavelet design and machine learning applied to nonintrusive load monitoring.
- Wavelet is determine using procrustes analysis are used to construct new wavelets to match the load signals to be detected
- Pervious used Daubechies filters.
- Firstly the author compared short-time Fourier trans- form (STFT) and continuous wavelet transform (CWT) when used to extract the features in transient for use in NILM. The study concluded that CWT analysis is more suitable to handle transients in NILM compared to STFT.



Part 4:
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"Classification of Household Devices by Electricity Usage Profiles". (Jason Lines¹, Anthony Bagnall¹, Patrick Caiger-Smith², and Simon Anderson², {paddy, simon}@greenenergyoptions.co.uk <http://www.greenenergyoptions.co.uk>).

(Jason Lines¹, Anthony Bagnall¹, Patrick Caiger-Smith², and Simon Anderson², {paddy, simon}@greenenergyoptions.co.uk <http://www.greenenergyoptions.co.uk>)

- Electricity usage profile every 15 minutes over a fixed interval of time.
- This research use data mining electricity usage patterns generated by 'smart meters'.
- Smart meters record and transmit data.
- Used time series classification.



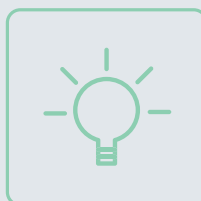
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ELSEVIER:- "**Understanding usage patterns of electric kettle and energy saving potential**" (D.M. Murray ↑, J. Liao, L. Stankovic, V. Stankovic) Department of Electronic and Electrical Engineering, University of Strathclyde, 204 George St., Glasgow, United Kingdom(2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)).

- Using data from a longitudinal study across a sample
- They demonstrate power consumption information and time of use information, together with the proposed mathematical model
- Adaptive Neuro Fuzzy Inference System (ANFIS) for prediction the data.



Part 4:
Reference

