



## Low Risk Research Ethics Approval

Project title

**Comparative Analysis of Missing Data Estimation Techniques for Wind Farm Time Series.**

### Record of Approval

#### Principal Investigator

|   |   |
|---|---|
| I <b>request an ethics peer review</b> and confirm that I have answered all relevant questions in this checklist honestly.  | X |
| I confirm that I will carry out the project in the ways described in this checklist. I will immediately suspend research and request new ethical approval if the project subsequently changes the information I have given in this checklist. | X |
| I confirm that I, and all members of my research team (if any), have read and agreed to abide by the Code of Research Ethics issued by the relevant national learned society.   | X |
| I confirm that I, and all members of my research team (if any), have read and agreed to abide by the University's Research Ethics, Governance and Integrity Framework.  | X |
| I understand that I cannot begin my research until this ethics application has been approved.   | X |

Name: Ali Abouyahia (7070MAA)

Date: 21/05/2021

#### Student's Supervisor (if applicable)

I have read this checklist and confirm that it covers all the ethical issues raised by this project fully and frankly. I also confirm that these issues have been discussed with the student and will continue to be reviewed in the course of supervision.

Name: Hafiz Ahmed

Date: 21/05/2021

#### Reviewer (if applicable)

Date of approval by anonymous reviewer: -

## Low Risk Research Ethics Approval Checklist

### Project Information

|               |   |
|---------------|---|
| Project Ref   | P122346   |
| Full name     | Ali Abouyahia   |
| Faculty       | Faculty of Engineering, Environment and Computing                                     |
| Department    | School of Mechanical, Aerospace and Automotive Engineering                            |
| Supervisor    | Hafiz Ahmed   |
| Module Code   | 7070MAA   |
| EFAAF Number  |   |
| Project title | Comparative Analysis of Missing Data Estimation Techniques for Wind Farm Time Series. |
| Date(s)       | 21 May 2021 - 13 Aug 2021   |
| Created       | 21/05/2021 09:53  |

### Project Summary

Forecasting plays an important in ensuring optimal planning and management of electric grid with large penetration of wind energy sources. However, missing data in wind farm time series often drastically reduces the forecasting accuracy which leads to inefficient management of wind energy. This project aims to critically analyse various missing data estimation techniques in the context of wind farm time series.

|   |    |
|---|----|
| Names of Co-Investigators and their organisational affiliation(place of study / employer)       |    |
| Is this project externally funded?  | No |
| Are you required to use a Professional Code of Ethical Practice appropriate to your discipline? | No |
| Have you read the Code?   | No |

## Project Details

|   |  |
|---|--|
| What are the aims and objectives of the project?  | <ul style="list-style-type: none"> <li>•Understand forecasting technique(s)</li> <li>•Understand how and why corrupted data affects forecasting.</li> <li>•Analyse how corrupted data affects forecasting.</li> <li>•Analyse how corrupted data can be handled for the forecasting to be successful.</li> <li>•Compare various data cleaning techniques.</li> <li>•Plot analysis and findings.</li> </ul>  |
| Explain your research design  | <p>Python, MATLAB and simulink are the three means to be used in order to analyse the data. The latter will be provided by the university and/or researched as a form of timeseries. As the main objective is to find the most efficient forecasting techniques even with missing or corrupted data the overall process should be as follow :</p> <ul style="list-style-type: none"> <li>•Identify the problem</li> <li>•Explore data and propose solutions</li> <li>•Select best solution</li> <li>•Build and test solution</li> <li>•Evaluate solutions</li> </ul> |
| Outline the principal methods you will use  | <ul style="list-style-type: none"> <li>•Data collection using matlab and/or python</li> <li>•Data representation ( Excel charts, Matlab plots)</li> <li>•Forecasting technique simulation ( using Python and/or Simulink)</li> <li>•Data from books, websites and databases ( yet to be determined which ones)</li> </ul>  |
| Are you proposing to use a validated scale or published research method / tool?   | No   |
| Does your research seek to understand, identify, analyse and/or report on information on terrorism or from terrorist organisations, require access to terrorist groups or those convicted of terrorist offences or relate to terrorism policies in other international jurisdictions? | No   |
| Does your research seek to understand, identify, analyse and/or report on information for other activities considered illegal in the UK and/or in the country you are researching in?   | No   |
| Are you dealing with Secondary Data? (e.g. sourcing info from websites, historical documents)   | Yes  |
| Is this data publicly available?  | Yes  |
| Could an individual be identified from the data? e.g. identifiable datasets where the data has not been anonymised or there is risk of re-identifying an individual   | No   |
| Are you dealing with Primary Data involving people? (e.g. interviews, questionnaires, observations)   | No   |
| Are you dealing with personal data?   | No   |
| Are you dealing with sensitive data (special category data)?  | No   |

|  |     |
|--|-----|
| Is the project solely desk based? (e.g. involving no laboratory, workshop or offcampus work or other activities which pose significant risks to researchers or participants) | Yes |
| Will the data collection, recruitment materials or any other project documents be in any language other than English?  | No  |
| Are there any other ethical issues or risks of harm raised by the study that have notbeen covered by previous questions?   | No  |

**External Ethics Review**

| Question |   | Yes | No |
|----------|---|-----|----|
| <b>1</b> | Will this study be submitted for ethical review to an external organisation ? (e.g. Another University, Social Care, National Health Service, Ministry of Defence, Police Service and Probation Office) |     | X  |
|          | If YES, name of external organisation   |     |    |
| <b>2</b> | Will this study be reviewed using the IRAS system?  |     |    |
| <b>3</b> | Has this study previously been reviewed by an external organisation?  |     |    |