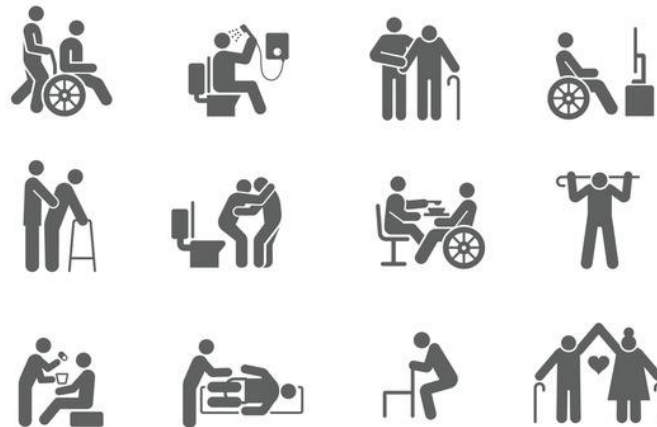


## Human activity recognition using smartphones

Recognition of human activities and activities of daily living is important for the development of assistive devices ranging from monitoring, tracking to physically supporting the user.



### Task

To develop a software system for recognition of activities of daily living (ADLs) by applying computational models. You will develop your recognition system using a dataset with signals from accelerometer and gyroscope collected from six activities (1: Walking, 2: Walking upstairs, 3: Walking downstairs, 4: Sitting, 5: Standing, 6: Laying).

For this task, you will use the Human Activity Recognition datasets (humanADLs.zip file) available in the Moodle page of the EE52036. The datasets are built from the recordings of 30 subjects performing ADLs while carrying a waist-mounted smartphone (Samsung Galaxy S II) with embedded inertial sensors.

### Variables in the dataset

For each record in the dataset it is provided:

1. Triaxial acceleration from the accelerometer (total acceleration) and the estimated body acceleration.
2. Triaxial Angular velocity from the gyroscope.
3. A 561-feature vector with time and frequency domain variables.
4. Its activity label.
5. An identifier of the subject who carried out the experiment.

**Assessment of your report**

You will prepare a report demonstrating the analysis, design and implementation of a software system for Recognition of Activities of Daily Living. In this project, you will implement and compare the performance of three different machine learning methods for the software system. Your report will be assessed based on the introduction and related work to the problem, methodology used to address the problem, implementation of the methodology, presentation, description and discussion of results, quality and robustness of results, clarity of writing and quality of presentation of the report.

Your report will have up to 5000 words clearly demonstrating the steps followed to solve the task for designing and implementing a software system for Recognition of Activities of Daily Living. The title page, contents and list of references are not part of the word count.

Your report should be organised into the following main sections. You should also add subsections according to the task selected and the design, methodology, implementation, etc.

1. Title page
2. Contents
3. Abstract
4. Introduction
5. Related work
6. Methodology
7. Implementation and results
8. Discussion
9. Conclusion
10. References

Assessment Criteria	Weighting
<b>Abstract</b>	<b>5%</b>
A+: Outstanding, complete and concise abstract of the project that presents the context of the work, contains an insight into the methodology, captures the most important results, provides an overview of the most appropriate conclusions.	
A: Excellent and concise abstract of the project that presents the context of the work, the methodology, the most important results and provides an overview of the most appropriate conclusions.	
B: Very clear and concise abstract that presents the aim, objectives and method within the context of the work and presents an overview of the results and conclusions.	
C: Clear and concise summary that presents the aim, objectives and method within the context of the work and presents an overview of the results and conclusions. Substantial rewriting required.	
D: Adequate abstract that contains a sufficient overview of the project but has shortcomings in establishing context or explaining the aims and misses the opportunity to highlight relevant results and conclusion.	
E: Insufficient and unclear abstract that fails to convey the purpose, results and outcomes of the project.	
F: Extremely weak abstract that leaves the reader more confused than informed about the purpose, results and outcomes of the project.	
<b>Introduction and description of related works, analysis techniques, design tools.</b>	<b>10%</b>
A+: Extremely effective, concise and clear introduction for the non-specialist. Outstanding and complete review of relevant previous works and very well references. The student shows excellent understanding of the topic.	
A: Excellent introduction for the non-specialist. Excellent and complete review of relevant previous work and very well referenced. The student shows a good understanding of the topic	
B: Very good introduction and review of previous work with a good set of references. The student shows a sufficient understanding of the topic. Further small refinements would be beneficial.	
C: Good introduction and review of previous work with reasonable references. Sound description but with some uncertainty of knowledge. The student shows a basic understanding of the topic.	
D: Adequate review of previous work with limited set of references. The student shows a basic understanding of the topic.	
E: Insufficient introduction and review of previous work with poor set of references. Insufficient understanding of the topic.	
F: Poor introduction with little or no review of previous work. Very poor set of references.	
<b>Execution of project, quality of methodology, implementation of methods, application of AI/ML knowledge.</b>	<b>30%</b>
A+: Expertly applied AI/ML methods, tools, quantitative and computational methods, and engineering principles in completing the project. Technical content of the highest quality. Work of the level of a professional engineer.	
A: Extensive evidence of the expert application of AI/ML methods, tools, quantitative and computational methods, and engineering principles in completing the project. Technical content of a high quality. Work of the level of a professional engineer.	

B: Strong evidence of the proficient application of AI/ML methods, tools, quantitative and computational methods, and engineering principles in completing the project. Technical content of a good quality.	
C: Good evidence of the proficient application of AI/ML methods, tools, quantitative and computational methods, and engineering principles in completing the project, although with some weaknesses.	
D: Some evidence of the application of AI/ML methods, tools, quantitative and computational methods, and engineering principles in completing the project. However, with limited complexity or some errors or omissions.	
E: Insufficient technical content, with significant errors or omissions and limited complexity.	
F: Very poor technical content of an erroneous or trivial nature.	
<b>Quality and robustness of results.</b>	<b>25%</b>
A+: Expertly presentation of experiments and results. Expertly use of a variety of formats and tools to clearly and comprehensively show the quality and robustness of the results. Technical content of the highest quality of a professional engineer.	
A: Extensive evidence of the expert presentation of experiments and results. Proficient use of a variety of formats and tools to clearly and comprehensively show the quality and robustness of the results. Technical content of a high quality of a professional engineer.	
B: Strong evidence of the proficient presentation of experiments and results. Good use of a variety of formats and tools to clearly and comprehensively show the quality and robustness of the results. Technical content of a good quality of a professional engineer.	
C: Good evidence of the proficient presentation of experiments and results. Good use of a variety of formats and tools to clearly and comprehensively show the quality and robustness of the results. Good technical content although with some weaknesses.	
D: Some evidence of the presentation of experiments and results. Reasonable use of a variety of formats and tools to clearly and comprehensively show the quality and robustness of the results. However, with some errors or omissions.	
E: Insufficient technical content, with significant errors or omissions and limited complexity.	
F: Very poor technical content of an erroneous or trivial nature.	
<b>Discussion and conclusions</b>	<b>20%</b>
A+: Outstanding discussion and evaluation of the results. Exceptionally clear discussions and concise presentation of conclusions. Honest and insightful project review.	
A: Excellent discussion and evaluation of the results. Excellent presentation of discussion and conclusions including the outcomes. Honest and insightful project review.	
B: Very clear and concise discussion and evaluation of the results. Well-informed conclusions are all based on presented work. Discussion, conclusions or project review could be further refined.	
C: Sound discussion and evaluation of the results. Majority of conclusions based on presented work. Discussion, conclusions or project review could be further developed.	
D: Adequate discussion and evaluation of the results. Some evidence that conclusions are based on presented work. Discussion, conclusions or project review would benefit from being further developed.	

E: Limited discussion and evaluation of results. Not clear how the conclusions were drawn from the presented work.	
F: Very poor discussion and evaluation of results and presentation of conclusions.	
<b>Quality of presentation</b>	<b>10%</b>
<p>The following categories will be considered in this assessment:</p> <p><b>Order</b> – the choice of a logical sequence for the selected material.</p> <p><b>Layout</b> – use of paragraphs, headings, numbering, tables and figures.</p> <p><b>Style</b> – the manner of writing; choice of words &amp; clarity of expression; conciseness.</p> <p><b>English</b> – accurate use of grammar, punctuation &amp; spelling.</p> <p><b>Graphics</b> – clear diagrams and graphs; legible labelling of diagrams and graph axes.</p> <p><b>References</b> – quality of references, use of consistent and correct style of referencing.</p>	
A+: Outstanding standard in most categories. No lower than excellent standard in others.	
A: Excellent standard in most categories. No lower than very good standard in others.	
B: Very good standard in most categories. No lower than good standard in others.	
C: Good standard in most categories.	
D: Satisfactory standard in all categories.	
E: Insufficient standard in some categories.	
F: Unacceptably low standard in most categories.	