Electronics and Computer Science
Faculty of Engineering and Physical Sciences
University of Southampton

Ashwinkrishna Azhagesh

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An AI Approach to Chaotic Physicl Systems:

Project supervisor: **Adam peugeot**

Second examiner: **TBD**

Progress report submitted for the award of
Bachelors of Science

Abstract

Physical laws are generalisation established through empirical observations of the physical world. It has taken humans centuries to discover, requires huge amounts of research, repeated experiments and plenty of scientists to produce an universally accepted law in the scientific community. Thanks to recent advances in neural networks and increased computational power, we can now train models to replicate and fasten our discovery of physical laws such as the laws of motion,also including chaotic systems such as the double pendulum, drastically shortening the time required to find new physical laws. Furthermore human's have a cognitive bias when looking at data, find it difficult to spot patterns in chaotic systems. This report explores how an AI without any bias or prior knowledge views the physical world, how it is capable of spotting chaotic patterns and how it is a tool that can reduce the time taken to make new discoveries.

Statement of Originality

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ECS Statement of Originality Template, updated August 2018, Alex Weddell aiofficer@ecs.soton.ac.uk

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5 Project Management:

5.1 Risk Assessment:

Issue	Impact	Prob	Risk	Mitigation
Unexpected delays and accidents	3	3	7	Include contingency plans and a 3 week break between major stages of the project, to allow for unexpected incidents.of the project, to allow for unexpected incidents.
Unable to generate enough experimental data due to lack of computational power.	4	1	14	Explore alternate more efficient ways of simulating data, consider using cloud infrastructure or potentially the Universities HPC facilities.
Challenges learning the double pendulum laws and the derivation.	2	4	5	Seek other resources from the Physics Department to learn the Physics required. Look up explanations online to learn.
Interpretability Challenges	3	2	10	Challenges in interpreting how the model works, can be mitigated through visualising the data, plotting results and through seeking ways to explain the model.

5.2 Gantt Chart: