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**Stage 2 Research Project: 2024 Topic Approval Form**

**Name: Malachi Halliwell Class: 11Wh**

What is your proposed Research Project topic question? *Write the question below.*

How effectively can a machine learning algorithm learn to balance a 2d pendulum on a moving cart

What are the main subtopics/aspects of your project? *These can be questions or dot points.*

**1.** What is a machine learning algorithm (MLA)

**2.** How do I build an MLA that learns a given task effectively

**3.** What is the best way to go around developing an MLA and simulation for my specific use case

a. Build in unity for inbuilt physics simulations, make in python to learn physics sim, start ‌‌

‌ b. MLA ‌from scratch vs using a premade library

**4.** How do I build a 2d pendulum and moving cart simulation in my chosen method

**5.** How does an MLA learn to balance a pendulum and how good is it at doing so

**6.** How long does an MLA take to learn a simple task/some form of time analysis?

Why did you choose this topic for your Research Project?

**1.** I think MLAs are cool and I want to learn more about them/how to apply them in applications

where they could be useful

**2.** Additionally I want to learn how to program a simple physics simulation

Which Capability/Capabilities will you develop in the Research Project and why? *See Student Guide*

**Literacy** – A large part of the RP is written

**Numeracy** – There is a lot of formulas to calculate the physics and MLA decisions that I will be investigating

**Information and Communication Technology** – A significant section of my RP will be programming and implementation of what I will research

**Critical and Creative Thinking** – Apart from formulas, a rendering engine and an MLA library, most of the programming will be my own work

Describe the main **research processes** you will use in your research project. *You must provide at least 3 types of research that you intend to undertake. You must also be specific – do not just write “I will do an interview/survey/find a mentor” you must be able to identify who you think you will interview/survey/select as a mentor*

**1.** I will do an interview with a lecturer from Adelaide University or University of South Australia

that teaches AI technology or MLAs and how to effectively train one.

**2.** I will search the internet for examples of people doing similar things and understanding why

their training methods worked the way they did

**3.** I will make an MLA and physics simulation with various different training methods

**4.** I will get feedback from peers about the realism and validity of the simulation in order to confirm its accuracy

What type is your Research Outcome likely to be?

An MLA can learn to quickly and accurately balance a 2D pendulum on a moving cart very well, given proper training methods and learning techniques/time

How will you ensure that your research is ethical? *(“Does no harm” – Think about your own safety, the safety of others, hazards and risks: Think about confidentiality and privacy: Think about plagiarism and referencing: Think about offending others: Think about the nature of your proposed topic)*

In programming, the primary ethical risk is plagiarism and breaking copyright liscencing. Some

projects maybe open source (source code free for the public) but may have a liscence preventing

anyone from modifying the code, whether it be personal or public use. In order to remain ethical, I

will have to investigate the liscences of each program’s source code that I use as a reference or

other similar fashion in my research. Some projects may also be closed source (source code is not

publically available), which I have to be careful about researching each project and its source

because it could be an illegally decompiled version which displays itself as an original.

**Topic Approval 2024**

[ ] Topic Approved

[ ] Provisional Approval\*(*Details:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

[ ] Not Approved\* (*Details:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

*\*You will need to resubmit another Topic Approval form*

Signed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Research Project Teacher)