Low Risk Research Ethics Approval

Project title

Optimizing Roulette with Proximal Policy Optimization: A Reinforcement Learning Approach

Record of Approval

Principal Investigator's Declaration

I request an ethics peer reviewI confirm that I have answered all relevant questions in this application honestly	X
I confirm that I will carry out the project in the ways described in this application. I will immediately suspend research and request an amendment or submit a new application if the project subsequently changes from the information I have given in this application.	X
I confirm that I, and all members of my research team (if any), have read and agree 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 agree to abide by the University’s Research Ethics Policies and Processes.	X
I understand that I cannot begin my research until this application has been approved and I can download my ethics certificate.	X

Name: Srinath Kaithoju (7150CEM)

Date: 11/07/2025

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: Dr. Omid Chatrabgoun

Date: 13/07/2025

Reviewer (if applicable)

Date of approval by anonymous reviewer: -

Low Risk Research Ethics Approval Checklist

Project Information

Project Ref	P187798
Full name	Srinath Kaithoju
Applicant type	Taught student
Semester	September
Area	College of Engineering, Environment and Science
Sub Area	School of Engineering
Supervisor	Dr. Omid Chatrabgoun
Module Code	7150CEM
EFAAF Number	
Project title	Optimizing Roulette with Proximal Policy Optimization: A Reinforcement Learning Approach
Date(s)	01 Jun 2025 - 15 Aug 2025
Created	10/07/2025 17:49

Project Summary

This project develops a Proximal Policy Optimisation (PPO) reinforcement learning agent to optimise betting in European roulette. A custom simulator will generate synthetic data replicating real rules. The agent will learn to adjust bet types and stakes dynamically. Performance will be compared to traditional systems (Martingale, Fibonacci) using return, drawdown, and risk metrics. All data is simulated, with no human participants.

Names of Co-Investigators and their organisational affiliation(place of study/employer)		
Full name	Notified	Accepted

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
Will this project involve international engagement or partnerships?	
Does your research fall within at least one of the 17 sensitive areas of the economy?	

Project Details

What are the aims and objectives of the project?	The aim of this study is to develop and evaluate Proximal Policy Optimization-based betting strategy for roulette which adapts in real-time and improves short-term performance under realistic constraints. The objectives of the project are presented below: a.To create the design of a realistic European roulette simulator and implement it. b.To integrate table rules, bet types, payout structures, bankroll limits, and spin horizons c.To implement a static betting system like Margingale for benchmarking. d.To create and train a PPO agent using environment feedback and engineered features. e.To perform proper evaluation of the PPO agent across multiple metrics including risk of ruin, drawdown and cumulative return. f.To perform comparison of the results obtained from PPO agents with baseline strategies via rigorous statistical testing. g.To finally package the simulator and PPO framework into a reproducible research toolkit and document all processes and results in the final dissertation report.

Provide a summary of the research, outlining the aims and objectives and/or research questions and the proposed research design and methods	The research will use a simulation-based methodology. This method will safely and ethically evaluate performance of strategy in a controlled setting (Cheng et al., 2014). In order to provide a realistic and comprehensive testbed for PPO training, the simulation will replicate real-world roulette rules and limits. Simulator and Environment Design Game Environment The simulator will be created in Python. It will simulate European roulette (single-zero) and supports various types of bets like dozen, red/black, odd/even, street corner, split, column, and straight. It monitors spin histories, bet results, and bankroll swings in addition to enforcing table betting restrictions. Baseline Strategies -Martingale -Fibonacci -Flat Betting PPO Agent Architecture -Built using deep learning libraries like Keras and PyTorch and trained using Stable PPO implementation. -State Space: Recent outcome history, bet history, current bankroll and derived features (e.g., hot/cold numbers). -Action Space: Bet type, target numbers or colors, and bet amount (modified to comply with casino regulations) are chosen. -Reward Function: Penalties for excessive risk or bet concentration are applied on the net change in bank
Are you proposing to use a validated scale or published research method/tool?	No

Data Analysis

Does the research seek to understand, identify, analyse and/or report on data/information on terrorism/terrorism policies?	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 analysing Secondary Data?	Yes
Is this data publicly available?	No
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?	No
Are you dealing with personal data?	No
Are you dealing with special category data (formerly known as sensitive data)?	No
Will the data collection, recruitment materials or any other project documents be in any language other than English?	No

Is your research a practical media project or performance?	No

External Ethics Review

Question			Yes	No
1	Will this project be submitted for ethics review to an external organisation?			X
	Name of external organisation			
2	Are you submitting to IRAS?			
	Have you actively involved, or will you involve, patients, service users, and/or their carers, or members of the public in the design of this project?			
	Provide details of the involvement			
3	Has this project previously been reviewed by an external organisation?			

Confidentiality, security and retention of research data

Question			Yes	No
1	What research data are you storing and in what format?	For European roulette simulations, I will store fictitious data created with my specially coded DataGenerator.ipynb notebook. This data comprises bankroll states over time, bet histories (amount, type of bet), simulated spin outcomes (numbers, colors), and training logs for reinforcement learning models (actions, rewards, value estimates). There is no identifying or personal information in any of the data; it is entirely synthetic. It will be saved CSV files. for data, and Jupyter notebooks (.ipynb) for code and logs, in access-controlled GitHub repositories and private Google Drive folders.		
2	Are there any reasons why you cannot guarantee the full security and confidentiality of any personal or confidential data collected for the project?			X
	Explain why you cannot guarantee full security and confidentiality of the data.			
3	Is there a significant possibility that any of your participants, and associated persons, could be directly or indirectly identified in the outputs or findings from this project?			X
	Explain why this may happen and if the participants/persons will be informed/consent to this			
4	Is there a significant possibility that a specific organisation or agency or participants could have confidential information identified, as a result of the way you write up the results of the project?			X
	Explain why this may happen/Explain why this is the case			
5	Will any members of the research team retain any personal or confidential data at the end of the project, other than in fully anonymised form?			X
	Explain why this may happen and what rationale there is for retention of personal/confidential data			
6	Will any member of the research team intend to make use of any confidential information, knowledge, trade secrets obtained for any other purpose than the research project?			X
	Provide further information			
7	Have you taken necessary precautions for secure data management, in accordance with the Research Data Management and Sharing Standard?		X	

8	Specify location (physical and electronic) where data will be stored	To guarantee safe backup and restricted access, I will use private, access-controlled folders with restricted sharing permissions to store all information electronically in Coventry University's OneDrive. I will also keep all code, logs, and synthetic datasets (CSV files and Google Colaboratory notebooks) in private GitHub repositories, to which only my professor and supervisor have collaborator access. For this project, I won't use any shared personal devices or unencrypted storage.	
9	Will you be responsible for destroying the data after project completion?	X	
	Who will be responsible for this?		
	Explain how any identifiable and anonymous data will be destroyed securely	As all data is fully synthetic with no personal identifiers, destruction will focus on securely deleting electronic files. On completion, all Google Drive folders, OneDrive directories, and GitHub repositories storing project data will be permanently deleted or made private and archived. Any local working copies will be wiped using secure deletion protocols to ensure no recoverable traces remain.	
	Planned disposal date	31 Dec 2030	