*Space Invaders*

Imran Kochi – ikochi1@aum.edu

Nigel Muchena – nmuchena@aum.edu

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Keywords—component, formatting, style, styling, insert (key words)

# Introduction

The "Space Invaders" project is a 2D arcade-style shooting game developed using the Qt framework. Inspired by the classic gameplay mechanics of *Galaga* and the original *Space Invaders*, this project aims to recreate the fast-paced, retro gaming experience where players control a spaceship and defend Earth from waves of descending alien enemies. The game combines simple controls, dynamic enemy behavior, and increasing difficulty to keep players engaged. Built with Qt’s powerful GUI and graphics tools, the project emphasizes modular design, smooth animations, and responsive input handling. This project not only serves as a tribute to vintage arcade games but also demonstrates the use of modern C++ and Qt techniques in game development.

# Ease of Use

Classic arcade games like Space Invaders and Galaga have had a lasting impact on game design, introducing fundamental mechanics such as wave-based enemies, simple controls, and progressively increasing difficulty. These elements have been widely studied and replicated due to their effectiveness in creating engaging gameplay. The success of these early games continues to influence modern recreations, with developers often using them as a foundation for learning or prototyping. Key design principles—such as predictable enemy patterns and escalating challenge—will be incorporated into this project to capture the original arcade feel.

From a technical standpoint, the Qt framework offers a practical environment for developing 2D games, especially for projects that prioritize cross-platform support and simplicity over complex 3D rendering. Although not a dedicated game engine, Qt provides essential tools like QGraphicsScene and QTimer that are well-suited for handling graphics, animation, and input in smaller-scale games. Previous projects recreating games like Tetris and Pong in Qt demonstrate its viability for similar retro-style games. This project leverages Qt’s capabilities to build a modern take on Space Invaders, focusing on core gameplay mechanics while exploring features like sound integration and user interface design.

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* Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as “3.5-inch disk drive”.
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*a**b* 

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## Some Common Mistakes

* The word “data” is plural, not singular.
* The subscript for the permeability of vacuum **0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.
* In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
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* There is no period after the “et” in the Latin abbreviation “et al.”.
* The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.

An excellent style manual for science writers is [7].

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Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include Acknowledgments and References and, for these, the correct style to use is “Heading 5”. Use “figure caption” for your Figure captions, and “table head” for your table title. Run-in heads, such as “Abstract”, will require you to apply a style (in this case, italic) in addition to the style provided by the drop down menu to differentiate the head from the text.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no subheads should be introduced. Styles named “Heading 1”, “Heading 2”, “Heading 3”, and “Heading 4” are prescribed.

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#### Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation “Fig. 1”, even at the beginning of a sentence.

1. Table Type Styles

| Table Head | Table Column Head | | |
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| copy | More table copya |  |  |

1. Sample of a Table footnote. (*Table footnote*)
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Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity “Magnetization”, or “Magnetization, M”, not just “M”. If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write “Magnetization (A/m)” or “Magnetization {A[m(1)]}”, not just “A/m”. Do not label axes with a ratio of quantities and units. For example, write “Temperature (K)”, not “Temperature/K”.

##### Acknowledgment *(Heading 5)*

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks ...”. Instead, try “R. B. G. thanks...”. Put sponsor acknowledgments in the unnumbered footnote on the first page.

##### References

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