FACULTY OF COMPUTER AND MATHEMATICAL SCIENCES (FSKM),

UNIVERSITI TEKNOLOGI MARA (UiTM)

CSC 649 - SPECIAL TOPICS IN COMPUTER SCIENCE

INDIVIDUAL REPORT

SYSTEMATIC LITERATURE REVIEW OF ARTIFICIAL INTELLIGENCE (AI) IN MUSIC COMPOSITION

STUDENT ID:	**2024927475**
NAME:	**MUHAMMAD SUFFIAN BIN ABU BAKAR**
PROGRAM:	**CDCS230 - BACHELOR OF COMPUTER SCIENCE (HONOURS)**
GROUP:	**CDCS2305C**

PREPARED FOR: DR. PRASANNA A/P RAMAKRISNAN

SUBMISSION DATE: 13 JULY 2025

TABLE OF CONTENT

1.0 INTRODUCTION

The integration of Artificial Intelligent (AI) in music composition has been widely used today that has been changed the way of existing music production becomes easier. According to Patil & Bhor (2023), studies on the use of AI in the music transformation revolution have been conducted since the 1950s using computers which highlight the modern developments in this creative field. The existing music production method also has its limitations where during production that requires mixing work using manual editing methods which leads to a lack of creativity and music for existing composers (Katyal et al., 2024). With this integration, it can create a wider collection of music and learn patterns and styles of music to producing new musical works from classical to electronic.

2.0 METHODOLOGY

In this systematic literature review, the methodology used to ensure that the literature retrieved was comprehensive and a critical analysis of the relevant academic discourse. The selection of literature sources followed a systematic approach with a focus on 12 searched peer-reviewed academic papers and relevant conference proceedings by using the key keyword combinations such as "Music Composition", "Music Generation", "Music AI" and "Artificial Intelligence". These searches were conducted by using several academic databases such as Scorpus, IEEE Xplore and the ACM Digital Library and Google Scholar by taking the period 2021-2025 by finding the relevance for current research.

Inclusion criteria:

- Focuses on the use of AI in music making include novel music elements or complete works in addition to analysis and classification.
- The literary language for the selection of literature is English.
- Detailing the algorithms used in song creation is needed (e.g., Neural Network or Generative AI) by using different approaches to song creation analysis using datasets as input.

Exclusion criteria:

- Filtering less relevant material by:
    - The paper does not directly focus on how to make music (the creative process).
    - The article assumes musical analysis without explanation of compositional and generative components.
    - The source (academic or non-academic) lacks a comprehensive technical explanation.
- Non-English language publications: Excluded to facilitate relevance for this study's analysis.

3.0 LITERATURE REVIEW

3.1 History of AI in Music Composition

The journey of Artificial Intelligence in music making has been going on for a long time where according to Cousins (2021), since 570 BC, the Ionian Pythagoras, a Greek philosopher, has discovered that numbers can be expressed as melodies through ratios and numbers and he described music as very mathematical. In 1951, music was implemented in technology with computing by Alan Turing, the creator of the Enigma code-breaking machine in World War II, who produced a machine that could create three simple melodies including "Baa, baa, black sheep" and "God Save the King" as the starting point of the use of computers in music composition (Cousin, 2021).

After the success made by Turing in producing songs through computers, in the early 1960s, the publication of the first work related to the composition of music algorithms was produced by a researcher from Russia, R Kh Zaripov using the Ural-1 mainframe computer (Cousins, 2021). These early attempts by several researchers to generate melodies using computers were able to demonstrate that computers could be used to perform creative work beyond simply playing back songs. Since several decades ago, in 2018, the use of AI in song creation was first started by the SKYGGE music collaborative and French Pop musician Benoit Carré in the making of an album according to research done by François Pachet and on Octocber 9, 2021, the

appearance of the previously unfinished tenth work of the great musician Beethoven with the help of AI (Cousins, 2021; Civit et al., 2022).

3.2 AI Role in Creative Process

Nowadays, AI is now widely seen in the creative industry as a creative partner where it not only moves as a tool to generate music with algorithms but generates music based on the depth and nuance of emotions. It is because according to Agwan et al. (2023), AI methods such as generative AI, Deep Learning and Natural Language Processing (NLP) have developed over time where these developments have made it possible to play a major role in composition, remixing even in performing arts and any field related to music. People also can express their musical experiences by using language, but the interpretation and meaning of music may change based on specific circumstances, including sentimental connections and memories (Choi et al., 2025). The capabilities of these existing AI methods can allow users to enjoy a musical experience where they can adjust the composition according to their taste and can also relate human cognitive states for specific purposes such as relaxation purposes. For the songwriting process, the literature highlights that nowadays, Artificial Intelligence (AI) has changed the idea of creating songs which originally required a manual process, for example according to Nugroho & Manggala (2024), the music composition process requires several steps starting from generating ideas and then making them into a structured piece of ideas where this process requires musical ability. Figure 3.1 below shows ways to compose songs in conventional methods that take time to complete the song.

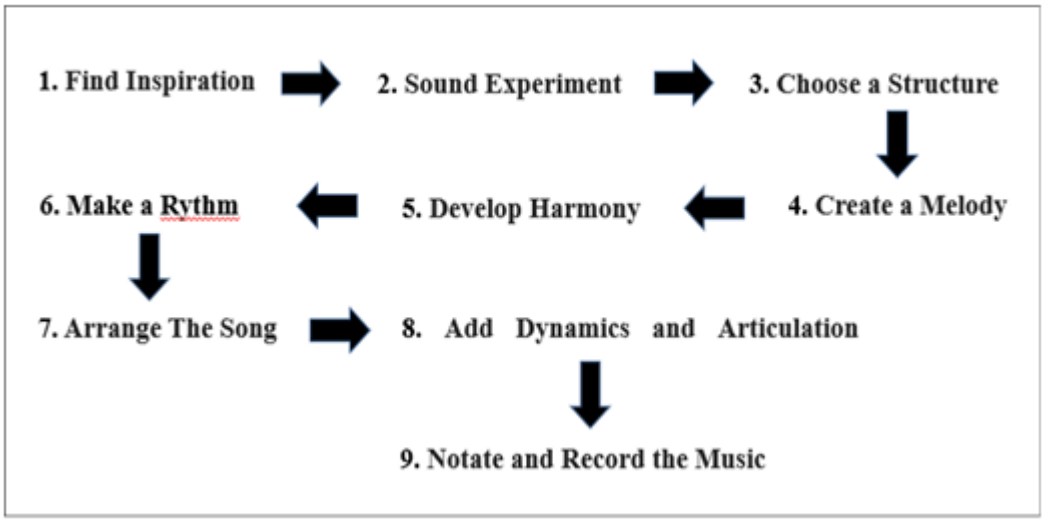

Figure 3.1 Steps in composing music by using conventional methods. (Nugroho & Manggala, 2024)

However, as the trend of using AI in music composition increases among society, music composition with the use of AI has helped in saving time and making the composition process faster and easier to carry out and increasing the efficiency in song production (Si & Li, 2024). It is due to the shortcomings of music production in conventional methods which are seen to take a long time and there are problems in terms of process efficiency. However, AI has increased accessibility for musicians with disabilities by providing assistive tools to overcome traditional barriers to music making, as according to Prapussornchaikul & Gonsalves (2024), his research demonstrates that AI has the potential to enhance emotional expression in musical composition while simultaneously bridging the gap between computational accuracy and the emotional depth of human talent.

Among notable AI tools in music composition include Suno AI and Google Magenta that aim to make it easier for users to quickly create music while simultaneously demonstrating the transformative potential of AI. Sora AI, AI-base application that offers user to create new musical compositions quickly approximately only 1 minute (Nugroho & Manggala, 2024). Google Magenta, a project under Google Inc that acts as initiative to showcasing the AI's transformative potential in the music sector (Patil & Bhor, 2023).

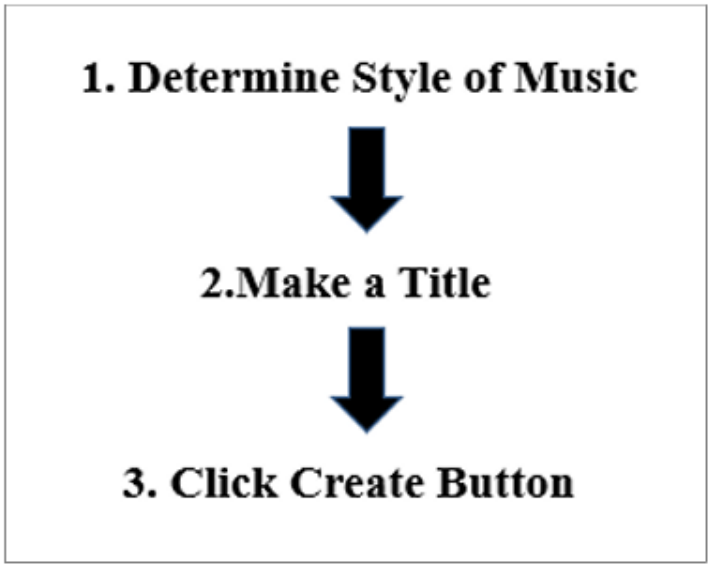

Figure 3.2 The process of making music compositions by using Suno AI. (Nugroho & Manggala, 2024)

Figure 3.3 The process of the musical signal of Google Magenta. (Patil & Bhor, 2023)

The understanding AI models used in music composition range from lyric and score generation to sophisticated performance accompaniment and complex

sound modeling, and among the AI models used are Generative AI (GenAI) Recurrent Neural Networks (RNNs), Long Short-Term Memory Networks (LSTMs), Generative Adversarial Networks (GANs), Transformer Networks, and Variational Autoencoders (VAEs) (Mansoori & Murali, 2022; Civit et al., 2022; Nugroho & Manggala, 2024).

3.3 The Ethical of AI in Music Composition

With the rapid advancement of AI music composition, significant ethical considerations have arisen, with issues involving the often-observed human bias towards AI-generated music being perceived as "soulless" (Cousins, 2021). This can raise issues of authenticity and creativity for a piece of music as AI is run using datasets trained through AI models such as Long Short-Term Memory Networks (LSTMs). Furthermore, AI models can also exhibit significant biases towards any style, for example, a study by Mycka & Mańdziuk (2025) focused on Western music styles in training data to pattern Chinese folk songs. This proves that AI has the potential to limit cultural diversity in the generated content. Not only that, but ethics are also very necessary in determining the music produced by AI and humans where according to Carty (2024), tracks produced by AI can be poor and inconsistent in quality leading to differences in human compositions and AI characteristics which are seen to be increasingly similar. Ethics are also needed to govern the use of AI in music composition as it could raise several key concerns that involve copyright and ownership law of AI-created music, intellectual property issues, potential for plagiarism, and the impact of AI on the livelihoods of human musicians. It is because according Carty (2024), there are loopholes in the regulation of data mining around the world and at the same time, the existing legal system has loopholes in addressing the issue of the use of copyright in training AI machines by AI companies.

3.4 Future Challenges and Trends of Music Composition

Based on the literature review I read, the field of music composition I found faces several challenges including the difficulty of producing long, coherent musical structures along with expressive music creation that can mimic human output (Mycka & Mańdziuk, 2025). AI has succeeded in achieving its objective in music production by making its output comparable to human songwriting capabilities. However, current trends show a growth in the music generation process, with hyper-personalized music generation through contextual information for targeted recommendations and an increasing focus on the creation of human-AI collaborations, where AI models are designed to work with musicians to make music composition easier. For future challenges, the future needs that include the development of diverse training datasets where it can reduce the cultural bias that driven by observations by Mycka & Mańdziuk (2025) where testing on Western musical style influencing the Chinese folk songs. There is also a demand for better objective evaluation metrics in the AI-generated music composition process to facilitate better model comparisons and in the same time, the establishment of a clear ethical and legal framework for AI music, especially regarding copyright, ownership, and the use of copyrighted material in training

4.0 DISCUSSION

4.1 Analysis and Comparison of Findings

The integration of Artificial Intelligence (AI) in music composition made a significant hanging through the introduction of innovative tools for the user either musician or non-musician. The ability of AI in music composition can make the music composition more capable where it can rival the compositions that are composed by human musician (Agwan et al., 2023). With the appearance of the AI model algorithms such as Generative AI (GenAI), Generative Adversarial (GANs) and Recurrent Neural Networks (RNNs), it became the instrumental of the music composition, generation and analysis. According to research made by Mansoori & Murali (2022) and Choi et al. (2025), here are how common AI models compose songs by following:

- Recurrent Neural Networks (RNNs): This model is useful when struggling with the capturing the long-term dependencies which can limit its effectiveness for composing a comprehensive music composition.
- Long Short-Term Memory (LSTM): An improvement method over RNNs where it can handle long-term dependencies and lead more globally structured music. It also can show the capabilities in learning and replicating the emotional characteristics of music and can track the elements such as notes per measure.
- Generative Adversarial Networks (GANs): This model used to produce the original and music creativity by learning fundamentals compositional rules from the data. It also provides diversified results and enhanced by techniques such as progressive.
- Prompt-based Generative AI: This model offers an efficient and intuitive method to user for music creation that can make it highly accessible to the user either musicians or non-musicians.

Despite their capabilities increasing, qualitative comparisons between the AI-generated music and human creation take a nuanced picture because some AI compositions model and human creation have their own differentiation in composition techniques. The need for ethical solutions is highlighted to maintain a balance between human creativity and effort, encompassing issues of originality, bias, uniqueness, and privacy (Carty, 2024; Katyal et al., 2024).

4.2 Research Gaps and Trends

The use of Artificial Intelligence (AI) in music composition has influenced important research gaps within the field:

- **The limitations of AI in creativity take a long and coherent musical forms:** While AI demonstrated the ability of generate music, the unresolved issue is producing lengthy snippets of emotive music that, even in the opinion of specialists, may mimic people (Mycka & Mańdziuk, 2025).

- **The subjective nature of AI music's artistic merit:** The standardized and comprehensive comparisons between various AI systems are made more difficult by the subjective nature of artistic excellence of AI music. It is because a comparison made by considering the challenging by the issue of developing objective instruments for performance evaluation that particularly in the context of music composition (Mycka & Mańdziuk, 2025).

- **Bias in AI models that stemming from limited training data diversity:** Training data is a major component of AI models that bring to the dearth of large-scale, high-quality and sufficiently of diversified music datasets that include a range of genres, styles, and emotional expressions. This lack of diversity in training data can cause biases in AI models that make AI's output replicating the traits or styles by overrepresenting it in the dataset rather than creating original music. According Cousins (2021), the AI can be modeled by the computer where it analyzes the data, find patterns like chord progressions and create new music in similar style when a lot of audio recording or musical scores are given.

- **Unresolved the issue of ethical and legal questions regarding AI music:** When the use of AI is increasing in music composition, an ethical solution is needed to put musicians ahead of AI where the law nowadays is not universally consistent and has been slow to adopt the necessary protections (Carty, 2024). It is because they can't achieve by their own priority to safeguard the future of the music industry.

4.2 Opportunities for Future Research

Through the literature I have written, there are several useful opportunities for future research:

- **Developing advanced models for complex and long-form compositions:** The development of AI models that can produce the truly complex, coherent and artistically expressive form musical compositions. It is because it can be a potential to improve the compositional efficiency and originality through intuitive engagement (Choi et al., 2025).
- **Integrating AI music with other art forms:** The integration of AI music composition can create a multi-modal creative experience such generating more expressive music from text that can be real-time interactive and experience where it gives a self-expression and emotional whether by composing, performing or listening (Mycka & Mańdziuk, 2025).
- **Establishing clear ethical guidelines and legal frameworks:** The development of AI models is a crucial part in ethical standards and legal frameworks because of the technology of AI that evolving and the complexity of the regulations that prevent it from being globally changed (Carty, 2024).
- **Research into reducing human bias against AI-generated art:** The critical opportunity lies in understanding and mitigating human bias against AI-generated art that can be interesting to observe the bias that people have to the idea that machines may produce lovely or some sense wonderful (Cousins, 2021).

5.0 CONCLUSION

In conclusion, Artificial Intelligence (AI) has innovated and transformed musical composition by expanding creative possibilities and democratizing them through a variety of methodologies. While significant challenges remain, notably in achieving long-term compositional coherence, addressing inherent biases, and navigating complex ethical considerations, the future of AI in musical composition offers promising beginnings that include democratizing music creation, exploring therapeutic applications, and fostering deeper human-AI collaboration. The continued ethical development of AI is important for reshaping and enriching the global soundscape.

6.0 REFERENCES

Agwan, M., Nemade, M., Roy, S., & Sinha, U. (2023). The Fusion of AI and Music Generation: A Comprehensive Review. *2023 6th International Conference on Advances in Science and Technology (ICAST)*, 90–94. https://doi.org/10.1109/ICAST59062.2023.10454942

Carty, B. (2024). *AI and Music Digital Streaming Platforms: The Effectiveness of Implementing an Ethical Identifier to Highlight AI Compositions* [Institute of Art, Design + Technology]. https://illustro-iadt.figshare.com/articles/thesis/AI_and_Music_Digital_Streaming_Platforms_The_Effectiveness_of_Implementing_an_Ethical_Identifier_to_Highlight_AI_Compositions/28596740?file=52992728

Choi, Y., Moon, J., Yoo, J., & Hong, J.-H. (2025). Understanding the Potentials and Limitations of Prompt-based Music Generative AI. *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems*, 1–15. https://doi.org/10.1145/3706598.3713762

Civit, M., Civit-Masot, J., Cuadrado, F., & Escalona, M. J. (2022). A systematic review of artificial intelligence-based music generation: Scope, applications, and future trends. *Expert Systems with Applications*, *209*, 118190. https://doi.org/10.1016/j.eswa.2022.118190

Cousins, S. (2021). Can AI be music to our ears? [Artificial intelligence - music]. *Engineering & Technology*, *16*(11), 38–41. https://doi.org/10.1049/et.2021.1111

Katyal, Y., Singh, S. V., Saxena, A., & Dhasmana, G. (2024). Exploring the Evolution of Music and Artificial Intelligence. *2024 International Conference on Communication, Computer Sciences and Engineering (IC3SE)*, 390–393. https://doi.org/10.1109/IC3SE62002.2024.10593129

Mansoori, M., & Murali, R. (2022). A Systematic Survey on Music Composition Using Artificial Intelligence. *2022 International Conference for Advancement in Technology (ICONAT)*, 1–8. https://doi.org/10.1109/ICONAT53423.2022.9726088

Mycka, J., & Mańdziuk, J. (2025). Artificial intelligence in music: recent trends and challenges. *Neural Computing and Applications*, *37*(2), 801–839. https://doi.org/10.1007/s00521-024-10555-x

Nugroho, Y. Y. T., & Manggala, P. P. M. D. (2024). *The Use of AI in Creating Music Compositions: A Case Study on Suno Application* (pp. 177–189). https://doi.org/10.2991/978-2-38476-348-1_13

Patil, R. P., & Bhor, P. A. (2023). Synergy of Artificial Intelligence and Music. *2023 6th International Conference on Advances in Science and Technology (ICAST)*, 155–159. https://doi.org/10.1109/ICAST59062.2023.10455075

Prapussornchaikul, T., & Gonsalves, T. (2024). Generative AI in Music and Mood Composition. *2024 6th International Workshop on Artificial Intelligence and Education (WAIE)*, 71–75. https://doi.org/10.1109/WAIE63876.2024.00020

Si, Y., & Li, X. (2024). Overview of the Application of Artificial Intelligence in Music Creation. *Proceedings of the 2024 International Conference on Artificial Intelligence, Digital Media Technology and Interaction Design*, 559–565. https://doi.org/10.1145/3726010.3726098