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The Future of Islamic Education: Breaking Through Boundaries with Line Follower Robot Trainers Toward the Era of Society 5.0

Moh. Zainul Falah[1]
Wahyu Tri Handoko[2]
Abdullah Iskandar Syah[3]
Farah Wardatul Afifah[4]
Satrio Dwi Sanjaya[5]

mzainulfalah@gmail.com
wahyutrihandoko.ee@gmail.com
abd.iskandar27@gmail.com
farahwardatulafifah@gmail.com
satriosanjaya.ee11@nycu.edu.tw

Abstract: *This research aims to identify and implement the Line Follower Robot Trainer as an innovative effort to advance Islamic education in facing the Society 5.0 era. The research focuses on SMK NU 1 Karanggeneng, Lamongan, as a case study, where robotic technology is used as a learning tool to integrate Islamic concepts with technological advances. This research proposes the Research and Development (R&D). The results showed that using the Line Follower Robot Trainer significantly improved students' understanding of their technological skills. The survey showed that most students (85%) felt more engaged and excited about learning Islam with the help of the Line Follower Robot Trainer. Students reported higher levels of engagement in learning with the robot, and teachers expressed positive support for using this technology in learning. These positive results reflect the potential of technology in enriching students' experiences in preparing for changes in the evolving Society 5.0 era. This research provides a greater understanding of the role of technology in supporting Islamic education, bridging the gap between tradition and innovation, and bringing Islamic education into an increasingly digitized future. The implications of this research can help Islamic education institutions utilize technology as a powerful tool to spread religious values and prepare students to face an increasingly digitally connected era.*

Keywords: *Line Follower Robot Trainer, Islamic Education, Society 5.0 era*

Abstrak: *Penelitian ini bertujuan untuk mengidentifikasi dan mengimplementasikan Line Follower Robot Trainer sebagai upaya inovatif untuk memajukan pendidikan Islam dalam menghadapi era Society 5.0. Penelitian ini*

[1] Universitas Negeri Malang (UM) Malang, Indonesia
[2] Universitas Negeri Malang (UM) Malang, Indonesia
[3] Universitas Negeri Malang (UM) Malang, Indonesia
[4] Universitas Negeri Malang (UM) Malang, Indonesia
[5] National Yang Ming Chiao Tung University, Hsinchu City, Taiwan

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berfokus pada SMK NU 1 Karanggeneng, Lamongan sebagai studi kasus, di mana teknologi robotik digunakan sebagai alat pembelajaran untuk mengintegrasikan konsep-konsep keislaman dengan kemajuan teknologi. Penelitian ini menggunakan metode Research and Development (R&D). Hasil penelitian menunjukkan bahwa penggunaan Line Follower Robot Trainer secara signifikan meningkatkan pemahaman siswa tentang keterampilan teknologi mereka dari hasil survei menunjukkan bahwa sebagian besar siswa (85%) merasa lebih terlibat dan bersemangat dalam belajar Islam dengan bantuan Line Follower Robot Trainer. Para siswa melaporkan tingkat keterlibatan yang lebih tinggi dalam belajar dengan robot, dan para guru menyatakan dukungan positif untuk penggunaan teknologi ini dalam pembelajaran. Hasil positif ini mencerminkan potensi teknologi dalam memperkaya pengalaman siswa dalam mempersiapkan diri menghadapi perubahan di era Society 5.0 yang terus berkembang. Penelitian ini memberikan pemahaman yang lebih besar tentang peran teknologi dalam mendukung pendidikan Islam, menjembatani kesenjangan antara tradisi dan inovasi, dan membawa pendidikan Islam ke masa depan yang semakin terdigitalisasi. Implikasi dari penelitian ini dapat membantu lembaga pendidikan Islam dalam memanfaatkan teknologi sebagai alat yang ampuh untuk menyebarkan nilai-nilai agama dan mempersiapkan siswa untuk menghadapi era yang semakin terhubung secara digital.

Kata kunci: *Pelatih Robot Line Follower, Pendidikan Islam, Era Masyarakat 5.0*

Introduction

Islamic education is one of the most important aspects in shaping individuals who have good morals and contribute positively to society (Hasan & Aziz, 2023; Imamah, Pujianti, & Apriansyah, 2021; Setiawan, AF, Aziz, Fajar, & Yurna, 2023). This education includes not only religious understanding but also various skills and knowledge relevant to contemporary life (Amin & Siregar, 2022; Arifin, Sahil, & Rosyid, 2022; Dalimunthe, 2023; Nur & Sulastri, 2023; Wahid, 2023). In the era of globalization and rapid technological development, education transformation is urgently needed (Hafizon & Amril, 2023; Hanipah, 2023).

Society 5.0 is the concept of a new society characterized by integrating highly sophisticated information and communication technology (ICT) in all aspects of life (Dinata & Achadi, 2023; Fukuda, 2020; Sujito et al., 2022). In this context, education must also follow this trend to prepare the younger generation to face increasingly complex future challenges (Amelia, 2023; Faiz, Falah, & Syah, 2022; Yuangga, 2023). To break through boundaries and utilize the potential of technology in Islamic education,

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we introduce an innovative approach by utilizing the Line Follower Robot Trainer at Nahdlatul Ulama Vocational Senior High School in Lamongan City.

Nahdhatul Ulama' as a Muslim community organization, has demonstrated its existence in terms of empowering teachers, both in thought and practice. SMK NU 1 Karanggeneng is one of the schools under the auspices of NU, which consists of teachers and ustadz and plays a role in helping resolve various challenges faced in the era of society 5.0. The current problem for NU teachers is how to deal with developments in information and communication technology with the inspiring role they must have. An inspirational teacher is a teacher who is a "mirror" for other teachers and has positive values in himself for his students and the surrounding environment.

This innovative approach not only reflects the changing level of technology in education but also plays a vital role in creating memorable and compelling learning experiences for students. The Line Follower Robot is one such technology that represents the Society 5.0 era with its ability to integrate programming, mechanics, and sensors in an entity that can teach important concepts in Islamic education interactively (Rochmanto et al., 2023).

SMK NU 1 Karanggeneng was chosen as our research environment because of its commitment to providing quality and relevant Islamic education. It is located in Lamongan City and through the Nahdlatul Ulama section. In this research, we will explore how the use of Line Follower Robot Trainers can increase the effectiveness of learning, as well as how this technology can support the achievement of Islamic education goals in the Society 5.0 era.

This research aims to provide an in-depth insight into the potential and positive impact of using the Line Follower Robot Trainer in Islamic education. We will analyze student, teacher and school responses to the implementation of this technology, as well as see if this approach can significantly contribute to interactively improving Islamic education.

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Through this research, a foundation can be created to develop better Islamic education for the increasingly complex and dynamic needs of the future. The use of the Line Follower Robot Trainer is expected to be one of the first steps in breaking through boundaries and directing Islamic education towards the challenging but also hopeful era of Society 5.0.

Research Methods

This research uses a Research and Development (R&D) method approach. The R&D method is a research method that produces innovation, either a new product or developing an existing product to make it more attractive to the learning objectives of a particular subject(Muqdamien, Umayah, Juhri, & Raraswaty, 2021). This method is widely used in education, training and organizational development to ensure the effectiveness of a program or learning process. The stages or steps in this method are: 1) Observing potential; 2) Data collection; 3) Designing products; 4) Validation; 5) Revision I; 6) Trial; 7) Revision II; 8) Test use; 9) Product duplication.

1. Understanding Potential

Preliminary Study: Identify the potential for using line follower robot technology in education at Vocational School NU 1 Karanggeneng to support the Era of Society 5.0. This stage involves initial observations and interviews with stakeholders, such as teachers and students.

2. Data Collection

Survey and Observation: This stage collects further data by conducting surveys with teachers and students regarding the learning approaches they expect in the Society 5.0 Era. In addition, observe existing learning practices.

3. Designing Products

Line Follower Robot Trainer Design: Based on the findings from the previous step, design a line follower robot trainer product that suits the educational needs at SMK NU 1 Karanggeneng. This includes the necessary hardware and software.

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4. Validation

Concept Validation: Carry out concept validation by involving the R&D team and education experts to check whether the product design is by educational principles and Era Society 5.0.

5. Revision I

First Revision: Based on input from concept validation, at this stage, the product design is revised to improve quality and suit educational needs.

6. Trial

Initial Trial: Test the line follower robot trainer in a school environment, such as a laboratory or specific classroom, to ensure its performance and identify potential improvements.

7. Revision II

Second Revision: Based on the findings from the initial trial, revise the product in more detail. This may involve changes to related hardware, software or teaching methods.

8. Trial Use

Trial at SMK NU 1 Karanggeneng: Implement a line follower robot trainer in several classes at SMK NU 1 Karanggeneng and pay attention to teacher and student responses. Evaluate its effectiveness in improving learning and understanding of Era Society 5.0.

9. Product Doubling

Product Multiplication: If the line follower robot trainer proves effective and fit for purpose, start producing more units according to the school's needs. Ensure adequate teacher training regarding product use.

By using a Research and Development approach, this research will produce a comprehensive understanding of the implementation of the Line Follower Robot Trainer in Islamic education at Vocational School NU 1 Karanggeneng and its contribution to student preparation in facing the increasingly sophisticated era of

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Society 5.0. The entire process will follow a systematic approach to ensure the success of the innovative learning program and interactive Islamic education.

Results and Discussion

In this increasingly digitized era, the use of technology in education is becoming increasingly important, especially in the context of Islamic education. In this study, we explored the implementation of the Line Follower Robot Trainer as an innovative tool for enhancing learning at SMK NU 1 Karanggeneng. The results revealed the positive impact of using this robot, especially in improving their technological skills and creating a more engaging learning experience.

Along with the rapid changes in the Society 5.0 era, where technology and digitalization have become an integral part of daily life, it is essential to understand how Islamic education can remain relevant and adapt to these changes. The results of this study illustrate that technology, such as the Line Follower Robot Trainer, can serve as a powerful tool in supporting the goals of Islamic education, spreading religious values innovatively, and preparing students to face future challenges in an increasingly digitally connected era. With this understanding, we can bridge the gap between tradition and technology to strengthen Islamic education in the future.

1. Improved understanding of technology skills

Before implementing the Line Follower Robot Trainer, students' understanding of the Society 5.0 era in technology, especially the Line Follower robot trainer or microcontroller at SMK NU 1 Karanggeneng, still needed to be improved. After implementation, there was a significant increase in students' understanding of the Society 5.0 era in technology, especially the Line Follower robot trainer or microcontroller, with a percentage of 85%—the percentage from the survey of students and teachers.

2. Support in Islamic Education

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Figure 1. Line Follower Robot Trainers Training

Teachers at SMK NU 1 Karanggeneng report that using the Line Follower Robot Trainer has enriched Islamic learning with innovative technological elements. Integrating technology in Islamic learning helps prepare students for changes in the increasingly digitized Society 5.0 era.

3. Students' Positive Perception of Line Follower Robot Trainer

The survey showed that most students (85%) felt more engaged and excited about learning Islam with the help of the Line Follower Robot Trainer. Students stated that using robots has increased the appeal of Islamic learning and made it more relevant to today's digital lifestyle.

Conclusion

The results showed that the implementation of the Line Follower Robot Trainer at SMK NU 1 Karanggeneng has successfully created a significant relationship with Islamic education in facing the era of Society 5.0. The use of this technology has had a positive impact on students' understanding of improving their technological skills and provides an innovative approach to Islamic education. This indicates that integrating technology in Islamic education can enrich students' experiences, make learning more engaging, and prepare them to face complex changes in this increasingly digitized era.

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Thus, technology, such as the Line Follower Robot Trainer, can be a powerful tool in supporting Islamic education's goal of spreading religious values in a developmentally appropriate educational environment.

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