

Bukti Korespondensi:

1. Submit (16 November 2023)
2. Hasil Review (21 November 2023)
3. Final Decision setelah revisi (6 Januari 2024)

1. Submit (16 November 2023)

[JRC] Submission Acknowledgement

1 pesan

JRC Editor <journalumy@gmail.com>

16 November 2023 pukul 09.19

Kepada: Mr Riky Dwi Puriyanto <rikydp@ee.uad.ac.id>

Dear Mr Riky Dwi Puriyanto:

Thank you for submitting the manuscript, "Design and Implementation of Fuzzy Logic for Obstacle Avoidance in Differential Drive Mobile Robot" to Journal of Robotics and Control (JRC). With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal website:

Manuscript URL:

<https://journal.umy.ac.id/index.php/jrc/author/submission/20524>

Username: rikydp

Journal of Robotics and Control (JRC) applies the Article Processing Charge (APC) for publication. The information can find the URL

<https://journal.umy.ac.id/index.php/jrc/about/submissions#authorFees>

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

JRC Editor

Journal of Robotics and Control (JRC)

Journal of Robotics and Control (JRC)

Scopus index journal: <https://www.scopus.com/sourceid/21101058819>

Scimagojr Q3

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Email: jrcfumy@gmail.com

Website: <http://journal.umy.ac.id/index.php/jrc>

2. Hasil Review (21 November 2023)

[JRC] Editor Decision

1 pesan

Dr. Iswanto Suwarno <journalumy@gmail.com>
Kepada: Mr Riky Dwi Puriyanto <rikydp@ee.uad.ac.id>

21 November 2023 pukul 12.09

Dear Mr Riky Dwi Puriyanto,

We have reached a decision regarding your submission to Journal of Robotics and Control (JRC), "Design and Implementation of Fuzzy Logic for Obstacle Avoidance in Differential Drive Mobile Robot".

Our decision is to: Revision Required

Thank you.

Best regards,
Dr. Iswanto Suwarno
Universitas Muhammadiyah Yogyakarta
jrcfumy@gmail.com

Reviewer A:

TITLE AND ABSTRACT - Provide comments and recommendations for the title and abstract.:

Your abstract provides a clear overview of your paper. Here are some comments and suggestions:

Clarity and Conciseness:

The abstract is clear and concise, providing a quick understanding of the paper's focus, methodology, and results.

Title Clarification:

Consider expanding the abbreviation "DDMR" at its first occurrence in the abstract. For example, "Differential Drive Mobile Robot (DDMR)" to ensure clarity for readers who may not be familiar with the abbreviation.

Precision in Description:

Consider specifying the angle difference between the ultrasonic sensors in degrees. This could add precision to your description and help readers visualize the sensor setup more accurately.

Specificity in Results:

Provide a bit more detail about the test environment, such as the complexity of the tunnel-shaped environment or any specific challenges faced by the DDMR. This could add depth to the description of your results.

Statistical Information:

If available, consider including statistical information about the variability in the DDMR's speed or any other relevant metrics. This can enhance the robustness of your findings.

Keywords Clarity:

The keywords provide a good summary of the main concepts in your paper. However, consider adding a brief explanation or definition for less common terms, such as "Mamdani," to ensure readers have a clear understanding.

INTRODUCTION - Provide comments and recommendations about the state of the

art, novelty, and contribution of the research.:

Your introduction provides a comprehensive overview of the significance of mobile robots in various sectors, the importance of obstacle avoidance in autonomous mobile robots (AMRs), and the application of fuzzy logic, particularly the Mamdani fuzzy inference system (FIS), in obstacle avoidance algorithms. Here are some comments and suggestions:

Structural Clarification:

Consider adding a brief roadmap of the sections within the introduction. For example, mention that the introduction covers the importance of mobile robots in different sectors, the role of AMRs in Industry 4.0, the significance of obstacle avoidance, the use of fuzzy logic algorithms, and the specific focus on Mamdani FIS for obstacle avoidance in this research.

Engagement and Context:

While you provide a solid foundation for the significance of mobile robots and obstacle avoidance, consider briefly highlighting the existing challenges or gaps in obstacle avoidance systems that your research aims to address. This will provide additional context for the reader.

Transition to Mamdani FIS:

As you transition to discussing fuzzy logic and the Mamdani FIS, consider explicitly stating the motivation for choosing this approach. What advantages does Mamdani FIS offer over other fuzzy inference systems, and why is it suitable for obstacle avoidance?

Terminology Clarification:

When introducing technical terms like "fuzzy inference system," briefly explain them to ensure that readers, especially those less familiar with the field, can follow your explanation.

Clarity in Contribution:

The contribution of your research is well-stated, but you could consider emphasizing the specific benefits or innovations your fuzzy logic-based obstacle avoidance algorithm brings. For instance, does it offer improved accuracy, real-time responsiveness, or cost-effectiveness?

Roadmap for the Article:

While you provide a broad organizational structure in the last paragraph, consider a more detailed mention of what each section will cover. For instance, briefly outline the content of Section 2 (method), Section 3 (results), and Section 4 (conclusion).

METHOD - Provide comments and recommendations for the method.:

Your method section provides a detailed explanation of the design of the Differential Drive Mobile Robot (DDMR) and the Fuzzy Inference System (FIS). Here are some comments and suggestions:

Differential Drive Mobile Robot Design:

Clarity and Flow:

The explanation of fixed robots and mobile robots is detailed and provides a good foundation for understanding the context. However, you might consider organizing this information into subsections for fixed robots and mobile robots for better readability.

Advantages and Disadvantages:

The advantages and disadvantages of fixed robots and mobile robots are well-discussed. Consider briefly summarizing these points to highlight the key differences.

Terminology Clarification:

When introducing terms like "Differential Drive Mobile Robot (DDMR)," consider providing a brief definition or explanation. This is especially

important for readers who might not be familiar with robotics terminology.
Visualization:

The addition of figures (like Fig. 1 and Fig. 2) greatly enhances the reader's understanding. Consider adding more figures where applicable to illustrate concepts, especially for the low-cost DDMR design.

Transition to DDMR Design:

Consider adding a smooth transition paragraph that explicitly introduces the focus on the design of the Differential Drive Mobile Robot (DDMR) before delving into its details.

Design of Fuzzy Inference System:

Introduction to Fuzzy Logic:

The introduction to fuzzy logic is comprehensive. However, you might consider adding a brief explanation of why fuzzy logic is specifically chosen for this application, emphasizing its suitability for handling uncertainty in robotic decision-making.

Role of Fuzzy Inference System:

Clearly state the role of the fuzzy inference system in the context of the mobile robot. How does it contribute to obstacle avoidance, and why is it a suitable choice for this application?

Fuzzification and Membership Functions:

The explanation of fuzzification and membership functions is clear. However, you might consider incorporating the membership function equations directly into the main text for easier reference.

Visualization of Membership Functions:

The inclusion of Fig. 4 is beneficial. Ensure that the figures are referred to appropriately in the text to guide the reader through the fuzzy inference system design.

Fuzzy Rules:

The explanation of fuzzy rules is clear. You might consider grouping them or presenting them in a tabular format for easier reference.

Aggregation and Defuzzification:

The discussion of aggregation and defuzzification is concise. Consider emphasizing the importance of these steps in obtaining a clear decision from the fuzzy system.

Equation Clarity:

Ensure that equations are presented clearly with proper formatting, and consider numbering them for easier reference.

General Suggestions:

Subheadings:

Consider adding subheadings to break down the method section into subsections for Differential Drive Mobile Robot Design and Fuzzy Inference System Design.

Roadmap:

Consider providing a brief roadmap at the beginning of the method section to outline the key steps or components that will be discussed.

Application Context:

Explicitly state how the designed DDMR and Fuzzy Inference System contribute to the overall goal of obstacle avoidance or any specific application.

Technical Details:

If applicable, consider providing additional technical details, especially if the paper is targeted at an audience with a strong technical background. Remember to adapt these suggestions based on the specific requirements and

conventions of your paper.

RESULTS AND DISCUSSION - Provide comments and recommendations for the research results and discussion.:

Results and Discussion

Mathematical Calculations and Fuzzy Inference System:

Clarity of Explanation:

The explanation of the mathematical calculations and the steps involved in obtaining left and right motor speed values is clear and well-organized. Ensure that the explanation remains accessible to readers with varying levels of expertise in robotics and fuzzy logic.

Table Presentation:

Table II provides a comprehensive summary of the mathematical calculations. Consider adding brief headers to the columns for clarity, and ensure that the table is referred to in the text when discussing specific results.

Defuzzification Process:

The defuzzification process is well-explained, and the final left and right motor speed values are clearly presented. Consider providing a brief explanation of how negative speeds correspond to backward movement, reinforcing the link between fuzzy logic rules and robot behavior.

Experimental Results:

Implementation of Fuzzy Logic:

The transition from mathematical analysis to the implementation of fuzzy logic in real-time testing is smooth. Clearly state how the results of mathematical calculations are applied to control the DDMR's movements in response to sensor inputs.

Figures and Visualization:

Fig. 7 effectively visualizes the DDMR's movement in different environments. Consider adding labels or captions to the figures to guide readers in understanding the test scenarios.

Test Summary:

Table III succinctly presents the key results of the DDMR testing. Ensure that the units for distance and time are consistently applied throughout the paper.

Discussion of Results:

Consider expanding the discussion around the implications of the results. For instance, discuss how the DDMR's performance aligns with expectations based on fuzzy logic rules and if there were any unexpected behaviors observed during testing.

Average Speed Calculation:

Clarify the method used to calculate the average speed, and explicitly state if it was a significant metric for evaluating DDMR performance.

Comparative Analysis:

If applicable, consider comparing the results with existing literature or similar studies to provide context for the DDMR's performance.

General Suggestions:

Conclusion Integration:

Consider connecting the results and discussion more explicitly with the objectives or hypotheses outlined in the introduction. Discuss how the achieved results contribute to the overall goals of the paper.

Limitations and Future Work:

If there are limitations to the study or areas for improvement, briefly mention them in the discussion. Additionally, consider suggesting potential directions for future research based on the findings.

Language Clarity:

Ensure that the language used in presenting results is concise and precise. Avoid unnecessary jargon and provide definitions for any terms that might be less familiar to a broad audience.

Reader Guidance:

Include clear transitions between subsections within the results and discussion to guide readers through the logical flow of information. Remember to adapt these suggestions based on the specific context and requirements of your paper.

CONCLUSIONS - Provide comments and recommendations for conclusions.:

Your conclusion effectively summarizes the key points of your research and presents the main findings. Here are some suggestions to enhance and refine the conclusion:

Reiterate the Main Contributions:

Begin by summarizing the main contributions of your research. For example, emphasize that the Mamdani fuzzy inference system was successfully implemented on a low-cost differential drive mobile robot (DDMR) using three ultrasonic sensors for obstacle detection.

Highlight Successes and Achievements:

Clearly state the successful outcomes of your experiments. Mention that the variable distance from the three sensors effectively regulated the speed of the left and right DDMR motors, enabling obstacle avoidance and targeted movement.

Suggest Areas for Further Research:

Indicate potential avenues for extending this research. You've already mentioned DDMR kinematics as a promising area for further exploration. Elaborate on how incorporating DDMR kinematics could enhance the robot's movements, making them more natural and adaptive.

Discuss Practical Implications:

Consider discussing the real-world applications and practical implications of your findings. How might this research contribute to the field of robotics or address specific challenges in mobile robot navigation? Highlight any potential applications or industries that could benefit from your work.

Reflect on Limitations:

Acknowledge any limitations or constraints in your study. This demonstrates transparency and opens the door for future researchers to build upon your work. For instance, mention if there were any specific scenarios where the DDMR faced challenges or if there are aspects of its performance that could be further improved.

Conclude with a Strong Statement:

End the conclusion with a strong and positive statement that reinforces the significance of your research. Emphasize how your work contributes to the advancement of robotic systems and the potential impact it could have on various applications.

REFERENCES - Provide comments and recommendations for reference.:

- Please adjust/modify the paper following the article journal template. See the PDF published paper.

DECISION RECOMMENDATION - Choose the decision recommendations.:

Minor Revision

Major Revision (Rereview)

GENERAL COMMENT - Provide overall comments and recommendations of the paper.

Give feedback for the paper's structure, conformity to the template, clarity, grammatical construction, etc.:

- Please adjust/modify the paper following the article journal template.

See the PDF published paper.

Reviewer B:

TITLE AND ABSTRACT - Provide comments and recommendations for the title and abstract.:

Focused Objective: The abstract succinctly outlines the primary objective of the research, which is implementing a fuzzy logic algorithm for obstacle avoidance in a differential drive mobile robot (DDMR) equipped with ultrasonic sensors.

Specific Implementation Details: It provides clear information about the input sensors (three ultrasonic sensors) and their configuration (angle difference of 45 degrees), offering a precise understanding of the sensory setup used for the fuzzy logic algorithm.

Outcome Description: It concludes with a specific outcome – the successful implementation of the Mamdani inference system as an obstacle avoidance algorithm, demonstrated by the DDMR navigating a tunnel-shaped environment and reaching its goal without collisions.

Lack of Technical Depth: The abstract lacks technical depth regarding the fuzzy logic algorithm's intricacies or the specific rules used in the Mamdani inference system. Providing more insights into the decision-making process or the rules' complexity would enhance the technical understanding.

Limited Test Result Discussion: While the abstract mentions the DDMR successfully avoiding obstacles and reaching its goal, it lacks detailed insights into the overall performance evaluation, such as obstacle detection accuracy or real-time responsiveness.

Absence of Comparative Analysis: The abstract does not discuss how the proposed fuzzy logic-based obstacle avoidance method compares with existing methods or benchmarks. Including a comparison would provide a clearer understanding of its novelty or superiority over alternatives.

Missing Quantitative Metrics: It lacks specific quantitative metrics, aside from the DDMR's average speed, to evaluate the performance of the implemented algorithm. Metrics such as accuracy rates or efficiency measures would strengthen the abstract.

INTRODUCTION - Provide comments and recommendations about the state of the art, novelty, and contribution of the research.:

Comprehensive Overview: The introduction offers a comprehensive overview of mobile robots, their applications across various sectors, and their role in the industry 4.0 era, transitioning smoothly into the focus on autonomous mobile robots (AMRs) and the need for obstacle avoidance.

Clear Description of Fuzzy Logic: It provides a clear and accessible explanation of fuzzy logic, its relevance in decision-making for autonomous systems, and its application in obstacle avoidance for mobile robots.

Discussion on Fuzzy Inference System (Mamdani): The introduction provides detailed insights into the Mamdani fuzzy inference system, highlighting its advantages, interpretability, flexibility, and suitability for obstacle avoidance applications.

Lack of Specific Research Focus: While the introduction covers a wide range of topics related to mobile robots, AMRs, and obstacle avoidance, it lacks a

specific focus on the particular problem or novelty addressed by the current research. A more explicit statement about the unique contribution or research gap would enhance clarity.

Limited Technical Depth: Although it covers the general concepts of fuzzy logic and sensors used in obstacle avoidance, it lacks in-depth technical details about the specific implementation of the proposed algorithm or the experimental setup.

Missing Research Objectives: The introduction doesn't explicitly state the specific objectives or goals of the research, making it challenging for readers to understand the precise focus or aims of the study.

Limited Contextualization: The introduction could benefit from more context about the existing challenges in obstacle avoidance for mobile robots or a discussion about the current state-of-the-art solutions. Providing this context would highlight the relevance and significance of the proposed research.

METHOD - Provide comments and recommendations for the method.:

Detailed Overview of Robot Types: The section provides an extensive overview of fixed and mobile robots, discussing their characteristics, advantages, and applications across various environments. This context helps establish the relevance of differential drive mobile robots (DDMR) within the broader spectrum of robotics.

Clear Description of Differential Drive Mobile Robots: The explanation of differential drive mobile robots, their mechanisms, advantages, and limitations is elucidative. It describes their suitability for specific environments and tasks, contributing to a comprehensive understanding of their functionalities.

Introduction to Fuzzy Logic and Fuzzy Inference Systems: The section provides a comprehensive introduction to fuzzy logic and its relevance in robotics. It explains the concept of fuzzy sets, membership functions, and the role of fuzzy inference systems in decision-making for mobile robots.

Lack of Research-specific Focus: The Methods section extensively covers general concepts related to robots and fuzzy logic but lacks a specific connection to the research's unique methodology or implementation. It doesn't sufficiently tie these concepts to the actual experimental design or procedures.

Limited Technical Detail on Implementation: Although the section explains the theoretical concepts of fuzzy logic and the design of differential drive mobile robots, it lacks detailed technical information regarding the specific implementation of the proposed fuzzy inference system or the actual construction of the DDMR used in the study.

Missing Experimental Context: The section lacks a direct link between the described theoretical concepts and their application in the actual experiment. There's a need for clearer details about how the DDMR was constructed, how the sensors were integrated, and how the fuzzy inference system was implemented within the robot.

Limited Experimental Methodology: There's a lack of information regarding the experimental setup, data collection, or validation of the proposed system. Describing these aspects would offer readers a clearer understanding of how the research methodology was applied.

RESULTS AND DISCUSSION - Provide comments and recommendations for the research results and discussion.:

Detailed Explanation of Calculations: The section provides a step-by-step breakdown of the calculation process involved in determining the left and right motor speed values based on sensor conditions. It's good to see a

clear description of how the fuzzy logic algorithm is applied to calculate these values.

Use of Fuzzy Logic Rules: The inclusion of fuzzy inference rules and how they are applied to determine motor speeds based on sensor conditions is a strong point. It shows the application of theoretical fuzzy logic principles in a practical scenario.

Lack of Contextualization: While the section details the computational process for determining motor speed values using fuzzy logic, it lacks a clear connection to the broader context of the study or the specific experimental setup. Providing context regarding the experiment and how these calculations contribute to the overall research would enhance understanding.

Limited Discussion of Results: The section focuses heavily on the technical calculations but lacks an in-depth discussion of the implications of these results. It would benefit from discussing the significance of these speed values in the context of obstacle avoidance or the performance of the DDMR.

Missing Experimental Validation: There's a gap in explaining how these calculated motor speed values were practically applied or validated within the differential drive mobile robot (DDMR). It would be helpful to connect these calculations to real-world scenarios or actual tests performed on the DDMR.

Lack of Comparative Analysis: The section lacks comparison with expected or optimal values. It would be beneficial to include a discussion comparing these calculated motor speeds with expected or ideal values for obstacle avoidance or smooth navigation.

CONCLUSIONS - Provide comments and recommendations for conclusions.:

Clear Summary of Findings: The conclusion succinctly summarizes the key findings of the research, highlighting the successful implementation of the Mamdani fuzzy inference system on the low-cost differential drive mobile robot. It effectively encapsulates the main outcomes.

Specificity in Implementation: The section specifies the arrangement and function of the three ultrasonic sensors in identifying obstacles and regulating the DDMR's motor speeds. This specificity enhances understanding of the implemented system.

Lack of Detail: The conclusion lacks depth in discussing the broader implications of the findings beyond the immediate experimental results. It would benefit from expanding on how these findings contribute to the field of robotics or their significance in practical applications.

Limited Scope for Further Research: While mentioning the potential for further research by adding DDMR kinematics, it would be more informative to elaborate on the specific aspects or functionalities that could be enhanced or investigated in future studies.

Absence of Experimental Results Discussion: The conclusion doesn't discuss the experimental validation or actual performance of the implemented system. Including insights from the experimental results and their significance would strengthen the conclusion's credibility.

Lack of Comparative Analysis or Evaluation: There's no mention of comparisons with existing systems or methods, or a quantitative evaluation of the system's performance against specific benchmarks or standards. Incorporating such analysis would enhance the conclusion's depth and validity.

REFERENCES - Provide comments and recommendations for reference.:

DECISION RECOMMENDATION - Choose the decision recommendations.:

Minor Revision

GENERAL COMMENT - Provide overall comments and recommendations of the paper.

Give feedback for the paper's structure, conformity to the template, clarity, grammatical construction, etc.:

-

Reviewer C:

TITLE AND ABSTRACT - Provide comments and recommendations for the title and abstract.:

- The abstract is not representative of the content and contributions of the paper. The abstract does not seem to convey the rigor of research properly.
- The abstract should contain Objectives, Contributions, Methods/Analysis, Results, Findings, and Novelty /Improvement.
- Abstract must have 150-250 words that consist of 1-2 sentences about the Introduction, problem, and solution; 1-2 sentences about the research contribution (write the research contribution is...); 2-3 sentences about the method; 4-5 sentences about the result; and 1-2 sentences about conclusions.

INTRODUCTION - Provide comments and recommendations about the state of the art, novelty, and contribution of the research.:

- The research contributions of the paper should be articulated more clearly.
- Aside from the aim stated in the title, the research gap and the goals of the research are not specified, which leads to the reader missing the significance of the research.
- The introduction is poorly written and it does not properly refer to previously published studies. The authors need to carefully review the published literature, identify the gaps in the literature, and propose their approach to fill the gap.
- The introduction section must contain the research problem, solution, state of the art, novelty, literature review from previous research, and research contribution (the most important).
- Write the research contribution in the last part of the Introduction, such as "The research contribution is...." At least there are two research contributions.

METHOD - Provide comments and recommendations for the method.:

- Commonly, there are research flow, research diagrams, system block diagrams, control system block diagrams, hardware wiring diagrams, pseudocode, or flowcharts in the method section.
- The figure must be clear, detailed, not blurry, easy to read and provide proper information.
- A flowchart should be added to the article to show the research methodology.
- Much more explanations and interpretations must be added to the method, which is not enough at all.

RESULTS AND DISCUSSION - Provide comments and recommendations for the research results and discussion.:

- In the results section, provide a comparison to a similar method from previous works (including citation) to enhance research contributions (compare the result with previous research).
- All figures and tables must be clear, detailed, not blurry, and easy to read. Each figure and table must be given a comprehensive explanation in at least one paragraph of analysis (crucial).
- The discussion section needs to be described scientifically. Kindly frame it along the following lines:

3. Final Decision setelah revisi (6 Januari 2024)

[JRC] Editor Decision

1 pesan

Alfian Ma'arif <journalumy@gmail.com>
Kepada: Mr Riky Dwi Puriyanto <rikydp@ee.uad.ac.id>

6 Januari 2024 pukul 20.29

Dear Mr Riky Dwi Puriyanto,

We have reached a decision regarding your submission to Journal of Robotics and Control (JRC), "Design and Implementation of Fuzzy Logic for Obstacle Avoidance in Differential Drive Mobile Robot".

Our decision is to: Accept Submission

Thank you.

Best regards,
Alfian Ma'arif
(SCOPUS ID: 57195619646 || WOS ID: N-7401-2019), Peneliti Teknologi Teknik Indonesia
alfian_maarif@ieee.org
Journal of Robotics and Control (JRC)
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