Respected reviewers

Firstly, I would like to thank you for your reviews, which have helped us significantly improve and expand our manuscript.

Secondly, I would like to inform you that one author had already dropped out of the research due to his privacy and family obligations.

Now there are three authors in the paper in the following order: Slađana Pantelić, Branisklav Vulević, and Saša Milić.

Thank you for your time and effort.

Sincerely,

Branislav Vulević

Reviewer 2

Review Report Form

Open Review

( ) I would not like to sign my review report
(x) I would like to sign my review report

Quality of English Language

( ) I am not qualified to assess the quality of English in this paper
( ) English very difficult to understand/incomprehensible
( ) Extensive editing of English language required
( ) Moderate editing of English language
(x) Minor editing of English language required
( ) English language fine. No issues detected

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	(x)	( )	( )
Are all the cited references relevant to the research?	( )	(x)	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	( )	(x)	( )	( )
Are the conclusions supported by the results?	( )	( )	(x)	( )

Comments and Suggestions for Authors:

1. General

The manuscript is acceptable for the journal. It is formatted and prepared in the context of scientific works.

2. Language

The paper readability and flow is good and clear. And it needs minor editing works for the best of the paper and the journal quality in general.

Answer:

The entire text has been improved, and the grammatical errors have been corrected.

3. Technicality

The abstract of the paper is completed, and formulated in a clear sequence. In the introduction part, flow and contents seems well, but the focus of the research issue is very shallow. It needs more elaborated articulations. The first two paragraphs about the rationale and the others the state of the arts. Why this research needed, how it will address and what will be the expected outcomes did not present clearly.

Answer:
The following paragraphs have been added to the „Introduction“:

Two key aspects have driven the research presented in the paper. The first relates to citizens' concerns about many IoT wireless devices and their impact on health. The second aspect concerns professionals. They are often exposed to strong electromagnetic fields during the repair and maintenance of equipment.

Their objectives are to promote and disseminate knowledge about the health effects of non-ionizing radiation, to develop and revise guidelines for exposure limits and safety measures, and to collaborate with other organizations and stakeholders to ensure the implementation of its recommendations.

A fuzzy decision-making process is a type of decision-making technique that is used to solve complex and vague problems. This technique uses fuzzy logic allowing the representation of vague and imprecise information. The aim of this paper is to discuss the fuzzy decision-making process, its advantages, and practical applications.

It needs more focused and defined articulation about the research work. The literature part a bit wide with long paragraphs but also it needs more synthesize) presentation than putting the general truth or classic sciences. It needs consultation of more and recent related papers that has been done before. In addition, conceptual comparative analysis or comparison is needed to improve the paper quality.
Section three or the methods is shallow and the proposed model flow chart and components are designed wrongly, or it needs remarkable modification.

Answer 1
The following paragraph has been added to the Chapter 2:

The advent of 5G technology has been a significant advancement in telecommunications. It offers faster internet speeds, increased bandwidth, and lower latency. However, as 5G networks continue to expand, there are increasing concerns about the potential health risks associated with this technology. 5G technology relies on higher frequency radio waves than previous generations of wireless technology, which means that more energy is needed to transmit signals. This increased energy creates more electromagnetic radiation, and the proximity of the 5G antennas, which are expected to be placed much closer together, creates a higher risk of exposure to electromagnetic radiation.

Answer 2
The following sentences and paragraphs have been added to the Chapter 4:

Millimeter wave technology is a critical component of 5G networks that promises to revolutionize the telecommunications industry.

Another challenge associated with millimeter wave technology is interference. The millimeter wave frequency range is highly congested, and multiple devices operating in the same frequency range can interfere with each other, resulting in signal degradation.

The following solutions successfully overcome the limitation of 5G millimeter waves technology:

1. Beamforming: Beamforming is a technique used to direct the transmission and reception of signals in a specific direction. It enables the millimeter wave signals to be directed towards the user, reducing the path loss and improving signal strength.

2. Massive MIMO: Massive MIMO (Multiple Input Multiple Output) is another technique that can overcome the limitations of millimeter wave technology. It involves the use of multiple antennas at the base station and the user's device, allowing multiple signals to be transmitted and received simultaneously, resulting in improved signal strength and reduced interference.
3. Hybrid Beamforming: Hybrid beamforming is a combination of beamforming and massive MIMO, allowing the antenna array to steer the beam in a specific direction while still maintaining the benefits of MIMO.

Answer 3
Figure 4 has been modified:

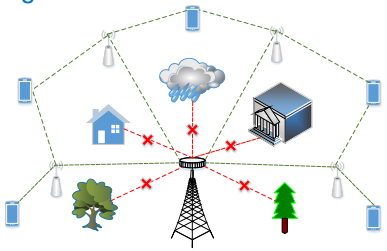

Figure 4. Limitations of 5G millimeter waves: All obstacles (rain, plants, and buildings) can attenuate the 5G signal [20].

Answer 4
Figure 5 has been modified:

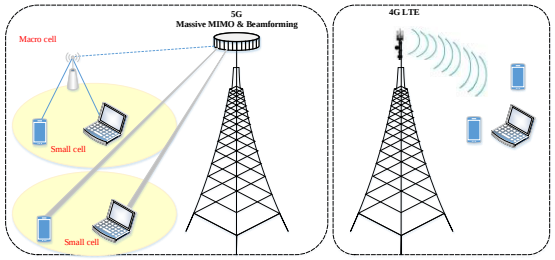

Figure 5. Beamforming techniques for avoiding obstacles using a bunch of low-power pole transceivers and wall transceivers.

Answer 5
The following paragraph has been added to the Chapter 5:

Introduction Fuzzy logic is a mathematical approach in which an object falls into a membership degree between completely true and false. Fuzzy logic has a wide range of applications, including control systems, decision-making, and pattern recognition. Fuzzy logic allows control systems to handle imprecise or uncertain data, which is particularly useful in situations where traditional control systems would be ineffective. One of the most common applications of fuzzy logic is in decision-making algorithms. Fuzzy logic can be used to model the decision-making process in a wide range of fields, including finance, engineering, and medicine. In multidisciplinary fields, fuzzy logic can be used to model the decision-making process that goes into designing complex systems. Fuzzy logic equations and fuzzy sets, make use of linguistic variables to express uncertain or vague reasoning. They are expressed by membership functions that assign a degree of membership to a fuzzy set. Some commonly used fuzzy logic equations include:

1. Mamdani's fuzzy inference method is used to map input variables to output variables using a set of fuzzy rules. The output is obtained by taking the weighted average of the rule outputs.
1. Takagi-Sugeno's fuzzy inference method represents the output as a linear combination of the inputs. Its ability to handle complex systems with both continuous and discrete inputs makes it a popular choice for applications ranging from control systems to data analysis.
2. Fuzzy clustering is used to group items based on similarity using a fuzzy membership function.
3. Fuzzy decision trees are used to represent decision-making processes based on fuzzy rules.
4. Fuzzy neural networks are used to learn patterns and relationships in data using fuzzy logic.

Answer 6
The following paragraph has been added to the Chapter 5:

Measurement methodologies used for developing decision-making algorithms are affected by different uncertainties. Many of them could be processed using Fuzzy logic systems type-1 (FLS-T1) that have clear and precise membership functions. Application of FLS-T1 may be insufficient in the following cases: different expert opinions, the impact of the unknown EMF sources, spatial allocation of measurement points, the proximity influence of objects and obstacles, weather conditions, etc. In such cases, fuzzy logic systems type-2 (FLS-T2) are used. FLS-T2 is characterized by a fuzzy membership function, whose values also belong to the interval [0,1]. These functions are three-dimensional and include a footprint of uncertainty. These are three-dimensional functions that include footprints of uncertainty.

Answer 6
The following subchapters have been added to the Chapter 5:

5.3. Fuzzy Logic Systems Type 2 and Type 3

Fuzzy logic systems type 1 can handle uncertainties with some limitations related to higher levels of uncertainty and complexity. To address these limitations, fuzzy logic systems type 2 (FLS-T2) have been developed [27-29]. FLS-T2 are widely used in control and decision-making algorithms and expert systems. FLS-T2 is more complex than FLS-T1. In FLS-T2, the membership functions are themselves fuzzy sets, and each membership function is defined by its upper and lower membership functions. Mamdani and Sugeno are the two main inference methods in FLS-T2.

The Mamdani inference method is widely used and involves a set of if-then rules. These rules consider the membership degree of inputs and compute the membership degree of the output. The Mamdani inference method uses a defuzzification process to convert the resulting fuzzy set back into a crisp output value. This inference method is suitable for applications with a high uncertainty degree.

The Sugeno inference method is another popular method for FLS-2. It uses a linear combination of input values to compute the output. This approach is faster and more accurate than the Mamdani method for certain applications, especially when the rule-base is small. Sugeno inference is more suitable when the system output mainly depends on the input values.

When selecting between Mamdani and Sugeno inference methods, the main factors to consider are the degree of dependency between inputs and outputs, the size of the rule-base, and the speed and accuracy of the system response.

One significant advantage of FLS-T2 is that it can handle higher levels of uncertainty and complexity compared to FLS-T1. The other one is that it can incorporate more expert knowledge, making the system more intuitive and easier to operate. However, a big disadvantage of FLS-T2 is that it requires more computational resources and complex calculations.

Fuzzy logic systems type 3 (FLS-T3) are a relatively new area of research in the field of fuzzy logic. These systems extend the classical type-1 and interval type-2 fuzzy sets to deal with more complex and uncertain environments. Until now, FLS-T3 only have a theoretical application, and the authors believe that the proposed algorithm would not be significantly improved by implementing them.

5.4. Fuzzy modeling

Fuzzy modeling has been widely applied to approximate nonlinear models by aggregating linear models with both numeric and linguistic inputs and nonlinear weighting functions [30-34]. Fuzzy modeling is a technique that uses fuzzy sets to model uncertain, imprecise, and/or vague information. Fuzzy modeling involves the following basic steps:

1. Fuzzification:

   The first step in fuzzy modeling is to convert the inputs into fuzzy sets. This is done by assigning degrees of membership to each input based on their values.
2. Rule base creation:

   The rule base is a set of if-then rules that represent the relationship between the inputs and the outputs. The rules are created based on expert knowledge or by using data-driven techniques such as clustering.
3. Inference:

   Inference involves combining the rules to generate the output. This is done by using fuzzy logic operations such as and, or, and not.
4. Defuzzification:

   The final step in fuzzy modeling is to convert the fuzzy output into a crisp value. This is done by using techniques such as the centroid method or the maximum method.

In a fuzzy modeling process, the first step is to define the problem and identify the variables that are relevant to the decision. Next, these variables are described using fuzzy sets, which assign degrees of membership to each variable. After defining the fuzzy sets, the experts make a set of "if-then" rules to the variables in order to arrive at a decision. Finally, the decision is made by aggregating the results of the rules using a defuzzification process, which converts the fuzzy output into a crisp, numerical value.

How the data are prepared, which features are selected, how, and why, did not clearly presented? so it needs more focus and remarkable changes. This section, tools and techniques should present clearly.
Section four and five looks good, however, the conclusion part is not presented as the research flow and contents., so please it needs more articulation in a consistent flow.

The chapter „Results and Discussion“ has been significantly improved:

Answer 1
The following paragraph has been added:

All data and frequency ranges, as well as corresponding membership functions and fuzzy intervals of observed parameters, in the fuzzy model, were also taken based on recommendations from ICNIRP guidelines. the presented algorithm that has been practically realized by software tool [35].

Answer 2
The following paragraph has been added:

Fuzzy rules are simple statements that specify a relationship between a system's inputs and output. They consist of an antecedent (if-portion) and a consequent (then-portion) connected by the implication operator.

Answer 3
Figures No. 9 and No. 10 have been improved:

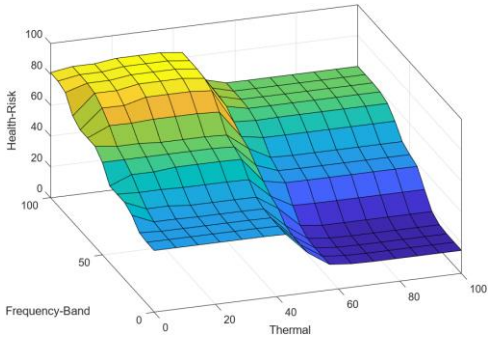

Figure 9. Thermal effects are dominant in the sub-millimeter range (FLS-T1).

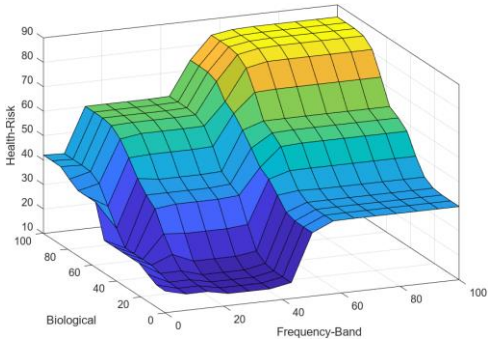

Figure 10. Non-thermal effects are dominant in the millimeter range (FLS-T1).

Answer 4
The following subchapters have been added to the Chapter 5:

6.2. Results – fuzzy model with Mamdani and Sugeno inference methods (type 2)

FLS Type 2 is composed of the following components (Fig.8): fuzzifier, fuzzy rules, inference engine, defuzzifier, and type-reducer [28]. The interval type 2 introduces uncertainty in both membership degrees and membership functions. It provides a more accurate representation of the complexities in decision-making processes where the level of uncertainty is high. Figure 11 shows a fuzzy model based on FLS-T2 (with same if-then rules) with the aim of validating the developed algorithm. The results of fuzzy modeling are shown in Fig.12 and Fig.13.

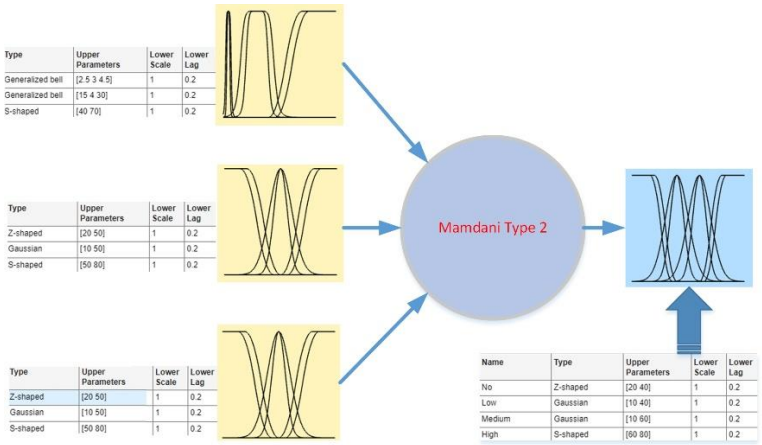

Figure 11. If-then rules in Fuzzy Logic System Type 2

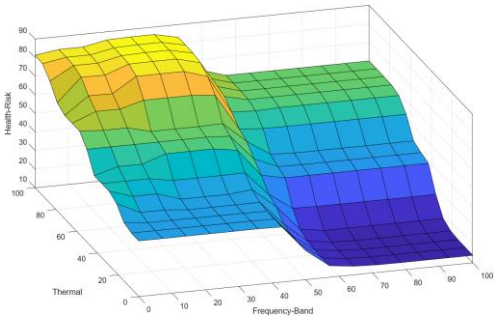

Figure 12. Thermal effects are dominant in the sub-millimeter range (Mamdani FLS-T2).

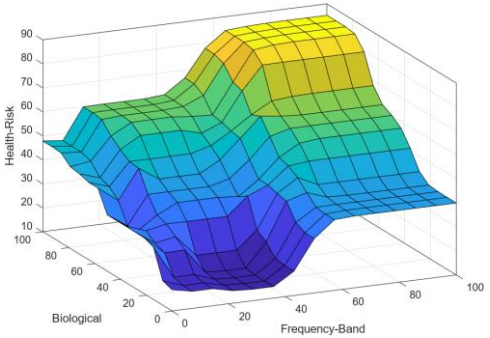

Figure 13. Non-thermal effects are dominant in the millimeter range (Mamdani FLS-T2).

6.2. Discussion

The use of FLS-T2, i.e., the use of membership functions whose values are also fuzzy numbers, slightly improves the accuracy of fuzzy modeling. The practical application of FLS-T2, with multiple inputs and outputs, is a complex mathematical problem. For this reason, the authors used FLS-T1 to develop a practically applicable algorithm. One of the practical advantages of the presented algorithm is its simple implementation in measuring devices. These devices could assess the impact of the measured radiation in the field in real time.

Answer 5
The following references have been added:

[27] Karnik, N.N.; Mendel, J.M. Introduction to type-2 fuzzy logic systems. In Proceedings of the 1998 IEEE International Conference on Fuzzy Systems, Anchorage, AK, USA, 04-09 May 1998.
[28] Mendel, J.M.; John, R.; Liu, F. Interval Type-2 Fuzzy Logic Systems Made Simple. . *IEEE Transactions on Fuzzy Systems* **2008**, *14*, 808–821.
[29] Mendel, J.M. General Type-2 Fuzzy Logic Systems Made Simple: A Tutorial. *IEEE Transactions on Fuzzy Systems* **2014**, *22*, 1162–1182.
[35] MathWorks. **Fuzzy Logic Designer**. Available online: https://www.mathworks.com/help/fuzzy/fuzzylogicdesigner-app.html (accessed on 30 April 2023).

4. Conclusion and recommendation

The conclusion part seems incomplete and did not show the research outcome as the why, the how and the what? It tells about the general truth and complaints.

Answer
The following paragraphs have been added to the Conclusion and Future Work:

In implementing a hands-on fuzzy decision-making algorithm, an important role is played by the process that involves the expert's role in analyzing knowledge bases and ICNIRP guidelines to define fuzzy numbers, choose inference methods, and create fuzzy rules. This is a three-step cyclical and iterative process affecting the final fuzzy model.

The main contribution of this work is a practically applicable methodology for quickly determining the impact of electromagnetic radiation on human health. This methodology should provide a good foundation for developing software solutions for portable devices that would give a rapid assessment of the impact of measured radiation based on in-situ measurements.

The authors will focus future research on improving the fuzzy decision-making algorithm by considering, in addition to ICNIRP guidelines, the results of medical studies analyzing the effects of wireless IoT devices in the urban environment.

5. Comments on the Quality of English Language

The paper readability and flow is good and clear. And it needs minor editing works for the best of the paper and the journal quality in general.

Answer
The entire text has been improved, and the grammatical errors have been corrected.