Response to Reviewer 1 Comments

Point 1: First of all, indeed, this research domain has recently became very intensively explored hence it is not easy to devise a method of ECG-based authentication that would be original in the first place. The Authors managed to come up with quite original method. This is worth emphasising. However, once the method originality is put aside, what is left is just another paper dealing with the ECG-based authentication. 70 papers long references only confirm how many publications related to this topic has recently appeared. I have no doubt (based on the included results) that the Authors have done a very detailed investigation of how their method works and what are its performance metrics. The problem is that they failed to present the results in the clear and easily comprehensible way. There are quite a few presentation-related issues, like figures 3, 4, 5, 8, 10, 11, 12, 13 as well as tables e.g. 3 and 4 are strangely aligned compared to the rest of the text. Then, figures 11a and 12b are too tiny to consider them useful. Maybe less but bigger or splitting this into some more and better readable figures would do some more justice to the results presented.

Response 1: Thank you for your comment. We aligned the figures and tables you've mentioned. Also, we updated figures 11 and 12 with higher-resolution images and increased the size of the letters in the graphs.

Point 2: In terms of the results - objectively, there is evidence of performing a very thorough investigation which resulted in providing a method guaranteeing very good accuracy. On the other hand, as far as the accuracy is concerned, the proposed method does not significantly outperform the alternative methods. But it is worth noting that the training times have been noticeably reduced. The processing power required for the proposed methodology is quite substantial which raises questions regarding the potential application domain (at the first glance it seems not suitable e.g. for wearable devices).

Response 2: Thank you for your comment. To show that our proposed method is suitable for the edge or wearable devices, we proved that our method takes less time to learn new dataset at first. Instead of comparing the processing power, we present some studies like [2] showing that it is possible to train more complex model (CNN and SVM based) on edge device.

[2] D. Hou, M. D. Raymond Hou and J. Hou, "ECG Beat Classification on Edge Device," *2020 IEEE International Conference on Consumer Electronics (ICCE)*, Las Vegas, NV, USA, 2020, pp. 1-4, doi: 10.1109/ICCE46568.2020.9043116.

TABLE II
MIT-BIH ARRHYTHMIA DATABASE TESTING RESULTS

Dataset	*ECG Beat Labels*	*Precision*	*Recall*
APC	***Atrial Premature Contraction***	***96.0%***	***98.0%***
LBB	***Left Bundle Brunch Block***	***99.5%***	***99.1%***
NOR	***Normal***	***99.1%***	***98.7%***
PAB	***Paced Beats***	***99.5%***	***99.9%***
PVC	***Premature Ventricular Contraction***	***99.1%***	***99.9%***
RBB	***Right Bundle Brunch Block***	***99.2%***	***98.0%***
VEB	***Ventricular Escape Beat***	***97.4%***	***99.9%***
VFW	***Ventricular Flutter Wave***	***99.9%***	***97.6%***

(Experiment result from [2])

Point 3: And last but not least, the conclusion is very brief as for a paper that is 17 pages long. Even if that was due to moving discussion of the results to another part of the paper.

Response 3: Agreed and corrected. We updated the conclusion section of our manuscript by adding discussion of the comparison between our method and some related works (page 14, line 21).

"The proposed method was also compared with the previous studies on ECG authentication using MIT-BIH and CYBHi database. The proposed algorithm achieved an accuracy of 97.7% and 99.4% using MIT-BIH and CYBHi respectively, showing the method could be as reliable as the other works."