DECLARATION OF GORDON MACPHERSON

I, Gordon MacPherson, am over twenty-one (21) years of age. I have never been convicted of a felony, and I am fully competent to make this declaration. I declare the following to be true to the best of my knowledge, information and belief:

1. I am Director Board Governance & IP Operations of The Institute of Electrical and Electronics Engineers, Incorporated ("IEEE").

2. IEEE is a neutral third party in this dispute.

3. I am not being compensated for this declaration and IEEE is only being reimbursed for the cost of the article I am certifying.

4. Among my responsibilities as Director Board Governance & IP Operations, I act as a custodian of certain records for IEEE.

5. I make this declaration based on my personal knowledge and information contained in the business records of IEEE.

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7. It is the regular practice of IEEE to publish articles and other writings including article abstracts and make them available to the public through IEEE Xplore. IEEE maintains copies of publications in the ordinary course of its regularly conducted activities.

8. The article below has been attached as Exhibit A to this declaration:

A.	W. Hoff, et al, "Analysis of head pose accuracy in augmented reality", IEEE Transactions on Visualization and Computer Graphics, Vol. 6, Issue 4, October – December 2000.

9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE's business. Exhibit A is a true and correct copy of the Exhibit, as it existed on or about December 29, 2021.

10. The article and abstract from IEEE Xplore show the date of publication. IEEE Xplore populates this information using the metadata associated with the publication.

11. W. Hoff, et al, "Analysis of head pose accuracy in augmented reality" was published in IEEE Transactions on Visualization and Computer Graphics, Vol. 6, Issue 4. IEEE Transactions on Visualization and Computer Graphics, Vol. 6, Issue 4 was published in October – December 2000. Copies of this publication was made available no later than the last day of the last publication month. The article is currently available for public download from the IEEE digital library, IEEE Xplore.

12. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I declare under penalty of perjury that the foregoing statements are true and correct.

Executed on: 1/6/2022

DocuSigned by:
Gordon MacPherson
E768DB210F4E4EF...

EXHIBIT A

Analysis of head pose accuracy in augmented reality

W. Hoff ; T. Vincent All Authors

Abstract:A method is developed to analyze the accuracy of the relative head-to-object position and orientation (pose) in augmented reality systems with head-mounted displays. From... **View more**

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Abstract:

A method is developed to analyze the accuracy of the relative head-to-object position and orientation (pose) in augmented reality systems with head-mounted displays. From probabilistic estimates of the errors in optical tracking sensors, the uncertainty in head-to-object pose can be computed in the form of a covariance matrix. The positional uncertainty can be visualized as a 3D ellipsoid. One useful benefit of having an explicit representation of uncertainty is that we can fuse sensor data from a combination of fixed and head-mounted sensors in order to improve the overall registration accuracy. The method was applied to the analysis of an experimental augmented reality system,

a movable object with respect to the head-mounted display was analyzed. By using both fixed and head mounted sensors, we produced a pose estimate that is significantly more accurate than that produced by either sensor acting alone.

Published in: IEEE Transactions on Visualization and Computer Graphics (Volume: 6 , Issue: 4, Oct-Dec 2000)

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Date of Publication: Oct-Dec 2000 **DOI:** 10.1109/2945.895877

ISSN Information: **Publisher:** IEEE

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