

Verification of ear canal obstruction in ear acoustic authentication

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Introduction: Ear acoustic authentication is a type of biometric authentication that uses the ear canal transfer characteristics that show the acoustic characteristics of the ear canal. One of the problems in ear acoustic authentication is that the acoustic characteristics of the ear may be different due to the variation of the measurement environment, such as pressure fluctuation. In this study, the acoustic characteristics of the human ear were measured under normal and occluded conditions. As a result, the difference in the accuracy of human ear acoustical recognition between constant and closed state conditions was confirmed.

Experiments: The study measured the acoustic properties of the ears of 7 people (20s to 70s) under normal and occlusion conditions. As a condition, the earphone was attached to the left ear 10 times and the measurement was performed.

Results and discussion:

Figure 1 shows the calculation results of the Equal Error Rate (EER) average. As a result, the difference in the accuracy of human ear acoustical recognition between constant and closed state conditions was confirmed. Specifically, the average EER was found to be 8.10% at constant state and 4.10% at closed state. It is considered that the authentication accuracy deteriorated due to the change in atmospheric pressure when the ear canal was obstructed and when the ear canal was not obstructed.

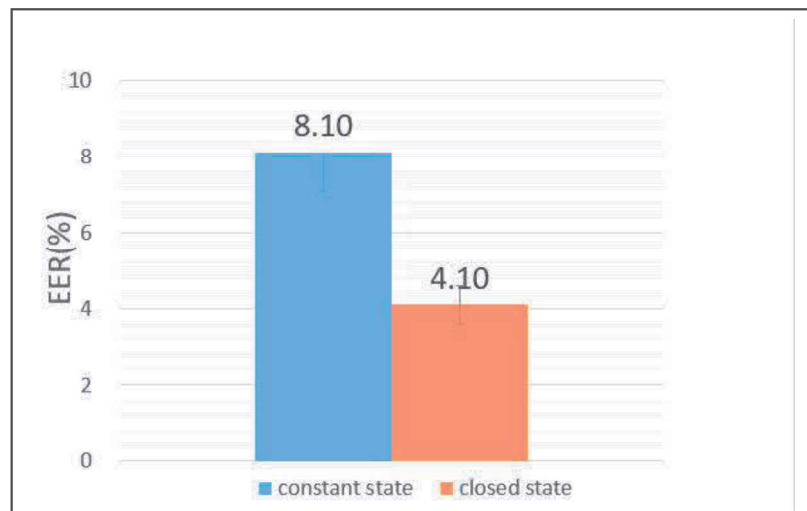


Figure 1. Calculation result of EER average

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