

# Smartwatch/Smartphone Cooperative Indoor Lifelogging System

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## Abstract

In this study, a lifelogging system is proposed for logging the daily activities of a user using a smartphone and a smartwatch cooperatively in indoor environments. The proposed system attempts to recognize a user's activities of daily living, including sleeping behavior and various physical activities, and to estimate the user's daily total energy expenditure (TEE) based on the recognized lifelogs. The TEE has the potential to be useful in personal healthcare management. The system includes both mobile and server systems. The mobile system consists of both a smartwatch and a smartphone used to classify ten activities, including sleeping activities, using sensors on both devices. The server system includes a database server and a set of programs to handle the collected lifelogs for users. An Android app is also developed to display the collected lifelogs and the estimated daily TEE on smartphones to assist in managing users' health. The experimental results show that the overall average recognition rate of seven activities is 97.5% with four subjects, and the total average error for the three states of sleeping behaviors is 6.64%.

**Keywords:** lifelogging system, smartphone, smartwatch, activity recognition

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