Abstract of Doctoral Thesis

Research on quantification of workload of industrial waste treatment workers through the use of information and communication technology

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Workers in the industrial waste industry face a variety of problems. Workers are exposed throughout the day to fatigue and stress resulting from the physical and psychological strain caused by the harsh working environment and work content, which can reduce the satisfaction, happiness, and work efficiency associated with their labor. It is crucial to manage working conditions to maintain a healthy employment relationship with waste workers. However, there is virtually no empirical information to support effective health management practices in the waste industry. Therefore, in this study, we used wearable devices to measure the biometric information of waste workers as they perform their jobs and estimate their physical and psychological workload. As an experiment, we conducted a demonstration test on workers engaged in two waste management facilities in Kyoto City. The following results were then obtained. 1: We measured biometric information specific to waste workers by comparing workers who handled waste with those who did not. 2: Factors that increase workers' workload were identified. 3: We established a method for estimating physical and psychological load from workers' biometric data. 4: We demonstrated the possibility of estimating physical and psychological load from workers' body surface temperature. 5: We showed the possibility that the workload may differ depending on the type of waste handled and the worker's age group, even for the same type of work. These results are highly novel in that they quantitatively clarify the actual conditions of waste workers, which have been insufficiently investigated. They also provide important insights into the health management of waste workers. In addition, it may provide labor management that is independent of the properties and labor content of each worker. In addition, a bibliometric analysis of the wearable device research domain was conducted to clarify the intellectual structure of this research domain.