

HUMAN FACTORS AND ERGONOMIC DESIGN FOR DRIVERS, CHILDREN AND SPECIAL NEEDS PEOPLE

Isti Surjandari^{1*}, T. Yuri Zagloel¹

¹*Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, Depok 16424, Indonesia*

In this special edition, we have selected 15 papers from the 4th SEANES International Conference on Human Factors and Ergonomics in South-East Asia 2016, which discussed the application of human factors and ergonomics to current local and global needs.

The first paper, written by R. Seva, J.A. Madrazo, J.R. Sy, and M.I. Tapel, develops a design for call center training software for visually impaired (VI) users. The experimental results show that placement of elements that appear on the interface, the type of wording used, and the option of reversal of actions affect the overall performance of VI users. Though the participants experienced longer task times with the proposed software designs, there is an assurance of the completeness of all functions. In addition, the number of errors committed was reduced compared to the number that arises with the existing software.

The next paper, written by A.M.J. Gutierrez, S. Arga, and K. Cruz, identifies the circadian clock behaviour of the shift worker and its relationship together with the shift schedule and contrasts these with the level of call centre agent performance in Philippines. Based on a two-way ANOVA, cognitive performance was measured. It was found that the three speech ability measures and reaction times were significantly different in terms of the performance deterioration during each schedule in relation to the body clock of the individual.

The third paper, written by H. Yuhaniz, A. Seraila, and S.R.A. Karim, proposes school furniture for rural and urban areas based on children's anthropometric data from both areas. Using a sample of 2400 primary school children aged seven to eleven years from both rural and urban schools in Malaysia, this study found that the anthropometrics were different in certain areas. Hence to provide ergonomic school furniture, it should consider the intended user population.

The fourth paper, written by L. Purwaningrum, P.Y. Loh, and S. Muraki, proposes an elementary school chair design that is easier for students aged 6–8 years to lift and move. Experiments based on 14 healthy, right-handed Indonesian and Japanese children showed that modifying the shape of the popular grasp with a curved rectangle edge based on the size of the children's grasp makes it easier for children to lift and move their chair and to carry the chair in the left holding position or below shoulder level.

The fifth paper, written by J.R. Octavia and L. Natasha, proposes a design for a mobile game application as an alternative therapy to support hand rehabilitation for stroke patients. The experiments showed that the stroke patients can interact well with the designed mobile game application and they felt that the game was a good exercise tool for them to use as part of their stroke therapy. Hence, the mobile game application was a good exercise tool for them to use as part of their stroke rehabilitation therapy.

The next paper, written by D. Siswanto, V. Lestari, and H. Iridiastadi, evaluates machinists' fatigue at the Indonesian Railway Company. They argue that fatigue assessment is an important

*Corresponding author's email: isti@ie.ui.ac.id, Tel. + 62-21-7888-8805, Fax. + 62-21-7888-5656
Permalink/DOL: <https://doi.org/10.14716/ijtech.v8i2.9295>

program that can be used by management to improve railway safety. They found that most of the machinists experienced sleep quality problems. Also, their sleepiness level continued to increase at work and their reaction time was worse at the end of work, although levels of physical fatigue were not substantial.

The seventh paper, written by D.S. Dewi, A.R. Irfoni, and A. Rahman, proposes a design of a self-monitoring blood glucose (SMBG) application that meets Indonesian diabetics' needs. They argue that SMBGs have not been widely used in Indonesia due to some difficulties in the SMBG applications, including the difficulty of interpreting blood glucose level and the required food consumption. Using the Kansei engineering method, this study develops the design of an SMBG Android-based application that is easy to use and provides appropriate information to diabetic patients in order to plan their diet program.

The eighth paper, written by A. Widyanti, N. Sofiani, and H. Soetisna, evaluates the sensitivity of blink rate as a potential objective measure of mental workload in a driving task that is easy to do and cost-effective. Based on a total of eight participants who were instructed to drive a simulator car with three different levels of difficulty, this study found that, whereas eye blink rate decreased, completion time, error, and NASA-TLX as a subjective measure of mental workload all increased with the increase of task difficulty. The authors also claimed that eye blink rate is more appropriate for measuring visually demanding than mentally demanding tasks.

The next paper, written by I. Bakri, evaluates the physiological responses of the driver when entering the vehicle cabin for the first time after the vehicle has been put in a parking place. Eight male volunteers underwent tests in a vehicle cabin that had been parked for two hours without any shade. Immediately after they entered the cabin, they were tested in three conditions. The results showed that the attempt to decrease the air temperature in the cabin by opening all the windows did not have a significant impact on their physiological responses. Conditioning the air temperature by turning on the air conditioning (AC) lowered mean skin temperature and heart rate but not core body temperature. To be specific, using the first or the second speed of the AC did not make a significant difference to the physiological responses of the volunteers.

The 10th paper, written by M. Mahachandra, Yassierli, and S. Munzayanah, investigate the effectiveness of one intake and intermittent intake of coffee in overcoming the driver's sleepiness due to partial sleep deprivation. Within subject experimental design method in a car-driving-simulator was applied to eight participants who met certain criteria. The study concludes that coffee can reduce sleepiness. Differences in the effectiveness of coffee provided by one intake and intermittent intake were also found. For the partially sleep-deprived drivers, providing coffee in one intake was proven to be more effective to counter sleepiness than was intermittent intake, both via objective and subjective measurement.

The 11th paper, written by R. Zuraida, H. Iridiastadi, and I.Z. Sitalaksana, discusses some Indonesian demographic aspects and road transportation, in particular their relationship to traffic accidents, and the associated characteristics of drivers. Data from the news were collected, involving drivers as respondents. The survey was conducted online and was directed at 138 commercial drivers. (Ten percent of the respondents were women.) This study found that a long driving time per week induced sleepiness and fatigue, which were considered as one of the causes of accidents. Lack of concentration was also found to be one of the dominant (51%) causes of accidents. Differences in age, gender, and driving experience did not seem to be related to the accidents.

The 12th paper, written by D.A. Pujiartati and Yassierli, investigate the effectiveness of peppermint odor on improving performance and reducing fatigue while conducting simulated Air Traffic Control (ATC) tasks. A total of 16 participants performed ATC tasks using SkyHigh

simulation software for two hours in two conditions (with and without peppermint odor). The simulator recorded participants' performance on the ATC tasks, and participants' fatigue was monitored using an electroencephalograph (EEG), a heart rate monitor (HRM), and a psychomotor vigilance task (PVT) apparatus. The results of this study showed that peppermint odor significantly improved simulation performance, based on all simulation indicators. The peppermint odor also significantly inhibited fatigue development, based on an EEG measure (decline in parietal β), two HRM measures (decline in low frequency power, LF and increase in high frequency power, HF), and a PVT measure.

The next paper, written by Yassierli, R.P. Sari, and K. Muslim, investigate the sleep quality indicators based on smartwatch measurement to assess fitness for work. A total of 18 men (20–26 years) completed three randomized day sleep conditions (bad–moderate–good) based on lighting, noise and temperature manipulations within a span of six hours' sleep. After day sleep, participants had 12-hour awake sessions at night during which they performed simulated computer tasks. Total Sleep Time (TST), Light Sleep Quantity (LSQ), Deep Sleep Quantity (DSQ), and REM Sleep Quantity (REMSQ) measurements were collected from a smartwatch during their sleep. Prior to performing computer tasks, their fitness for work was determined based on subjective measures, vigilance measures, and drowsiness measures. The results showed that TST, LSQ, and SQI-KSD can be used as measures for sleep quality and fitness for work.

The 14th paper, written by J. Valentino and T. Yogasara, discuss an effort to create a national car design that emotionally attracts Indonesia's automotive market can meet the challenge appropriately. By using the Kansei engineering type 1 category classification method, 164 Kansei words that represent exterior designs of 4×2 driven passenger cars were obtained from literature studies and interviews. Using an affinity diagram, the Kansei words were categorized into 12 groups and arranged on a scale comprising five semantic levels' product sample assessment. Results were further processed using factor analysis, after which nine groups remained. A collaborative design process with the product designer resulted in an exterior design of a hatchback car with four doors.

The last paper, written by Batubara and Dharmastiti, investigate the workers complain of muscle pain and fatigue with the current non-ergonomic work system, during whose use liquid aluminum is often spilled by workers when pouring the liquid into molds. Redesigning the liquid aluminum pouring tools used an integrated participatory ergonomics method combined with an appropriate technology (AT) concept. The result was an ergonomic liquid aluminum pouring tool; the newly designed ergonomic pouring tools allowed for a more natural working posture. Time efficiency increased by 25.81%, and productivity increased by 26.60%.

We hope that this special edition of IJTech conveys some new insights into the way we conduct our research. We are pleased to accept and respond to any comments and enquiries regarding the direction and content of IJTech.

With warmest regards from Jakarta,



Prof. Isti Surjandari
Editorial Board member



Prof. T. Yuri Zagloel
Editorial Board member