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The mobile safety concept for the elderly

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The needs which are related to the safety take precedence when wishes which are related to the technology have been asked for from the aged. In several studies a need for the safety services which also would operate outside the home has found. In the Easy project of the University of Oulu and Lapland the safety service to the tourists which uses GPS-based location information was tested. The safety service operates in the ordinary mobile phone in which has a Bluetooth connection. This tested service offers one solution to the need to extend the safety service also outside the home of the aged. In the tested service moving persons or vehicles in outdoors were followed in real time with the help of the designed computer application. The users of the mobile phone are seen over the map picture as symbols. The service serves the communication channel between the users of the service and it serves different services which are based on the location. The safety service has been built in Finland in the mobile phone which are generally use. It is believed that it has a positive effect on the acceptability of the safety service.

Difficulties of elevators for elder people: A field study

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The elevator is the most common and most public transportation method. Although the elevator is so general, its operation is not easy for everyone. Mainly the problem is alignment of push buttons and status displays. We are considering the improvement for preventing operation errors especially for elder people. This paper shows the ethno-methodological observation on the difficulties on elevators. Observations were done in June to September, 2003. At twelve different elevator site, we observed customer's operation and behavioural errors. Panel design was also investigated. At hall side, 11 elevators have the push type button and one has touch type which has no tactile feedback. Four out of eleven has weak lights and gives poor feedback. The cage position and upward/downward direction indicator varies at each elevator. Inside the cage, only 1/3 of the elevators have sound feedback on open/close button. Inside the cage, several errors were observed. The often observed case is pushing small indicators those show the positions of other slot elevators. Once, those were used for in-cage human elevator operators. Nowadays, there are no operators because of cost-cut, but these indicators are remaining. Since these 'other cage indicators' are lighten and the light moves, thus, many elder people push small indicator confusing with the button. Design of open/close button and alignment of floor button are also not standardized and cause errors and difficulties. On these design problems, we are now doing experiments with computer-simulated button panels.

Estimation method of traveling load originated from driving a wheelchair for a pedestrian assistance traffic system

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We study a route guidance system for wheelchair users which aims to make traveling and moving more easier by indicating the smallest load route. As to principal factors, there exist factors such as vertical direction slope, cross direction slope and surface level gap along a sidewalk. In this paper, these three load factors mentioned above were taken into consideration and analyzed statistically on the basis of experimental data such as physical load (travel time) and mental load (NASA-TLX), collected by wheelchair traveling and moving trials. As a result, a method which translate load factors of rowing a wheelchair into quantitative values was generated and also estimation formula (model) which convert the values into equality scale (cost) were established. To confirm the accuracy of the estimation models, actual link and route costs were collected by the experiment executed on an actual lattice like road network. Comparing the estimated costs which were calculated by using the cost estimation models, with the actual costs obtained by the experiments, comparatively higher correlations were shown. As a result, it is clarified that the estimation models are efficient to apply estimating link and route costs for the RGSW.

Study of wheelchair handle positions using biomechanical analysis

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Though many kinds of wheelchairs have been developed and used, depending on the recent situation of welfare and aging society, most of them may be standardized and stereotyped. Usually, there is no mechanism to adjust the height or direction of the handles, although each body size of wheelchair helpers differs a great deal. Since the handle height of the wheelchair is about 850mm generally, in case of the taller helper, the posture becomes forward bended style, and they often complain about health problems such as arm tension and low back pain by pushing the wheelchair for the long time. Therefore, this paper investigated the optimum handle height of the wheelchair, which was most easy to push, using the KANSEI (sensitivity) evaluation, electromyography (EMG) measurements for the muscle around shoulder, and the biomechanical analysis. The desirable direction of the handle was also investigated.

Comfort and safety navigation of an omni-directional mobile wheelchair driven by haptic joystick

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This paper presents the haptic feedback control of a holonomic Omni-directional Mobile Wheelchair (OMW) with a haptic joystick for the operation of disabled people or elderly people considering not only the navigation task but also user's safety. In this research a haptic joystick was designed and applied with being manoeuvrable for users and free of joystick's vibrations. A way to build the local map around OMW is presented by considering the reliability of sensors data such as ultrasonic and PSD sensor. If an obstacle is detected in the direction of movement based on the local map information, the impedance of the joystick in this direction is changed. Namely, the closer the obstacle is the bigger the impedance value becomes. By this function, users spontaneously understand that they are in risk of obstacle collision and then users can change the direction of movement by their decision in order to avoid it. Further, this paper presents comfort driving considering excluding the discomfort frequency ingredients by means of input shaping methods. The proposed approach is thought to be reasonable as a man-machine control system.

Head displacements during manual wheelchair propulsion on different floorings

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In newly designed buildings, physical barriers are rather removed, but floorings are less considered and bad flooring still prevents easy movement of wheelchair users. Flooring is the most significant factor that affects to the comfortability of wheelchaired person. Little research has measured vibration of the head. From the ergonomic aspect, discomfortness relates not only vibration also relates non-periodical displacement of the head. We measured head and shoulder displacements during manual wheelchair propulsion on various flooring setting, with infrared 3D motion capture system. The floor condition was a hard floor, thin carpet, run on and off 15mm thickness board, and on and off artificial lawn. From the analyzing result, we found the artificial lawn was most discomfort condition. To run on the artificial lawn, larger torque required and a neck was largely bent back and forth. On the artificial lawn, its reboundness makes the head vibrate. When run off the lawn, the neck was also bent by vertical gap and difference of friction and impact absorption. To reduce discomfort, we are now analyzing with various cushion seats.