Eco-Friendly Design of 'Door Buffer' by Minimizing Energy Waste and Slamming Force

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Our research is about designing a door closer to be effective on simultaneously minimizing thermal energy loss, finger jammed accident rate, and slamming noise, which aims sustainable design by developing a new algorithm and device called ‘Door Buffer’. The most important reason why we have conducted this research is largely due to our awareness of energy shortage, which causes tremendous economic problem in Korea that totally importing petroleum. Main goal is to find optimized condition and apply it to algorithm. We started by researching and theoretically analyzing a movement of the door. We collect data about temperature change, slamming force, noise difference, and door closing time. We couldn't find a perfectly optimized condition. Therefore we had to set a standard which suits for environmental sustainability. We made, analyzed a variety of possible solutions, and finally selected the simplest one, t×?dB. Since the only way to set a door’s movement to fit the standard is by changing a door closer’s damping parameter, we invented the device called ‘Door Buffer’. Using Monte Carlo methods as main principle, Door Buffer first measured a door closing time, opening angle, and noise difference and then save all the three data until it saves more than 1000 data. Also, Door Buffer calculates the average of the next expected door opening angle. Under 1000 data, the Door Buffer found out optimized condition for each door opening angle. This is how we can regulate door movement that well fits suitable standard.

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