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Boundary Alert System for Powered Wheelchair in Confined Area Training

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Abstract : Background: With powered wheelchair, patients can travel more easily and conveniently. However, some patients suffer from other difficulties, such as visual impairment, cognitive disorder, or psychological issues, which make them unable to control powered wheelchair safely. Purpose: Therefore, those patients are required to complete a comprehensive driving training by therapists on confined area, which simulates narrow paths in daily live. During the training, therapists will give series of driving instruction to patients, which may be unaware of patients crossing out the boundary of area. To facilitate the training, it is needed to develop a device to provide warning to patients during training Method: We adopt LIDAR for distance sensing started from center of confined area. Then, we program the LIDAR with linear geometry to remember each side of the area. The LIDAR will sense the location of wheelchair continuously. Once the wheelchair is driven out of the boundary, audio alert will be given to patient. Result: Patients can pay their attention to the particular driving situation followed by audio alert during driving training, which can learn how to avoid out of boundary in similar situation next time. Conclusion: Instead of only instructed by therapist, the LIDAR can facilitate the powered wheelchair training by patients actively pay their attention to driving situation. After training, they are able to control the powered wheelchair safely when facing difficult and narrow path in real life.

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