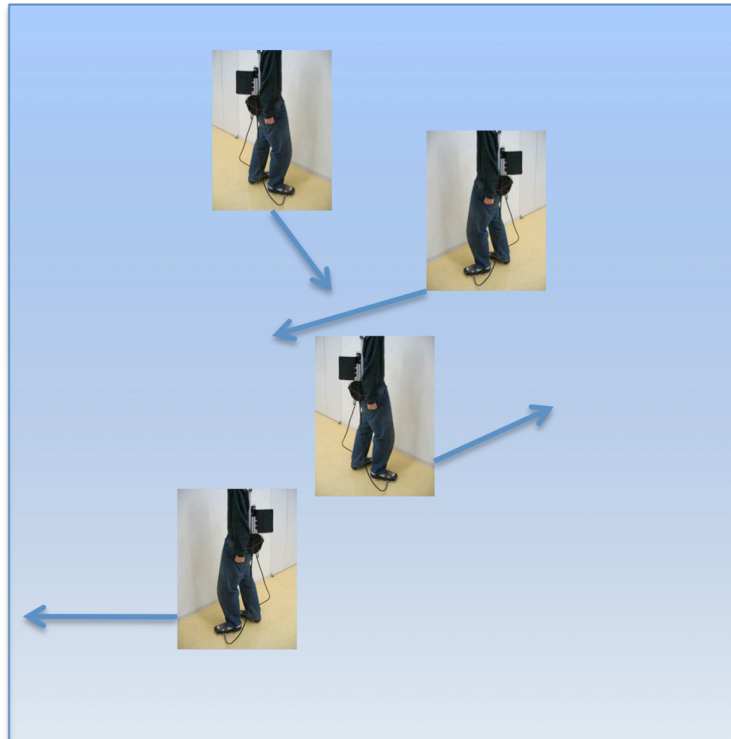


Collision avoidance of multi-users using Powered Shoes in a VR room

Consider four users moving simultaneously in a room of limited size, equipped with HMD for VR visualization, and wearing Powered Shoes that “approximately” cancel their intentional motion (see http://intron.kz.tsukuba.ac.jp/poweredshoes/poweredshoes_j.html).



The walkers can do steps (of some size) in any direction, and the Powered Shoes are able to recover a fraction (90-95%) of the size of the step, with a small uncertainty ($5-10^\circ$) with respect to the intentional direction. If desired, the Powered Shoes can also “move” the user forward or backward in its heading direction, independently from the intentional motion.

Derive a kinematic model of the system with the given assumptions and design a velocity-level control strategy that is intended for keeping the users in the room and avoiding collisions among them. Ideas on how to achieve these results may come from artificial potential fields and/or from multi-agent coordination methods.

Represent your simulation results with time plots of commands and other useful variables and with 2D stroboscopic views or movies of the collective motion.