

SKYDIVING CONTROL SYSTEM

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ABSTRACT

Skydiving, the act of a person jumping out of an airplane (or aircraft) and landing safely on the ground, has been a common practice since the early 1900's. Throughout the history of skydiving, skydivers have used parachutes to slow them to a speed that will allow them to safely land back to Earth. This research project involved designing a device that would allow a person to skydive without the need for a parachute. This device would need to be able to translate through the air space to the desired horizontal position, and hold that position throughout the duration of the flight while keeping a stable orientation. This research project is focusing only on the control of the position (and attitude) of the skydiving device and does not focus on the landing of the skydiver; however, prior stunts in skydiving have indicated that capturing a human traveling at terminal velocity is feasible.

The research project proved to be successful: an optimum design for the skydiving device was found by analyzing three different iterations of possible designs. Governing equations were developed for the skydiving device and a stability analysis of the pitch and roll rotations was conducted. The device was found to be statically and dynamically stable. Finally, the attitude and position control of the device was analyzed. The horizontal position of the device was found to be controllable by the control surfaces while maintaining a stable orientation of the device.