Using Intelligent Autonomous Holonomic Landing Gear in Crosswind Landings to Advance Aviation Safety

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In his experiment the author uses a side slip to land a model Cessna 170 in crosswind conditions. He hypothesizes that equipping aircraft with intelligent autonomous holonomic landing gear improves the safety of crosswind landings. The shift in the roll of the plane with holonomic landing gear was minimal. A holonomic wheel configuration enables an aircraft to compensate for crosswinds without compromising plane stability. The ability to maneuver holonomic wheels in any direction improves the safety of ground operations and facilitates taxiing the aircraft to and from the runway. As the author predicted, adding intelligence to the holonomic landing gear further increased stability by maintaining the aircraft's orientation to the wind during landing. The intelligence component of the holonomics system operates without pilot intervention. As the aircraft descends to 1,000 feet above ground level a stereoscopic camera, mounted above the aircraft's cockpit, provides a continuous video feed of the view from the aircraft and the location of the center lines on the runway to a computer for image processing. For each frame in which the vision algorithm detects the center lines on the runway, a 3D waypoint is generated. These individual waypoints are continually collected by the aircraft control algorithm. At each waypoint the front two wheels are auto adjusted toward the center lines of the runway, decreasing pilot strain and increasing the precision of the aircraft's landing.

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