Device to Prevent a Pallet Stacker Rollover

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Forklifts are widely used in business logistics due to their ability to move loads vertically. Their capability to lift loads to significant heights combined with their compact dimensions makes them particularly vulnerable to operational failures. The U.S. Bureau of Labor Statistics recorded 67 forklift-related fatalities in the United States in 2023. Even experienced operators are susceptible to human error, which can result in serious accidents, such as the one that occurred in early 2025 at a wholesale facility in Canoas (RS), which, according to Britto (2025), led to the victim losing movement in the legs. With the aim of reducing the risk of accidents during forklift operations, a functional prototype programmed in C++ was developed. The device performs real-time estimations of the transported load weight by measuring hydraulic pressure, as well as load height using an ultrasonic sensor. These values are compared with the maximum load chart provided by the manufacturer in order to restrict forklift operation within safe parameters. In addition, a tiller angle position sensor is used for monitoring, enabling the estimation of turning radius and the potential risk of rollover due to excessive speed during maneuvers. The project is currently in the testing phase to evaluate its effectiveness under simulated risk conditions.

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