

# Saving Farmers' Lives in Agricultural Incidents

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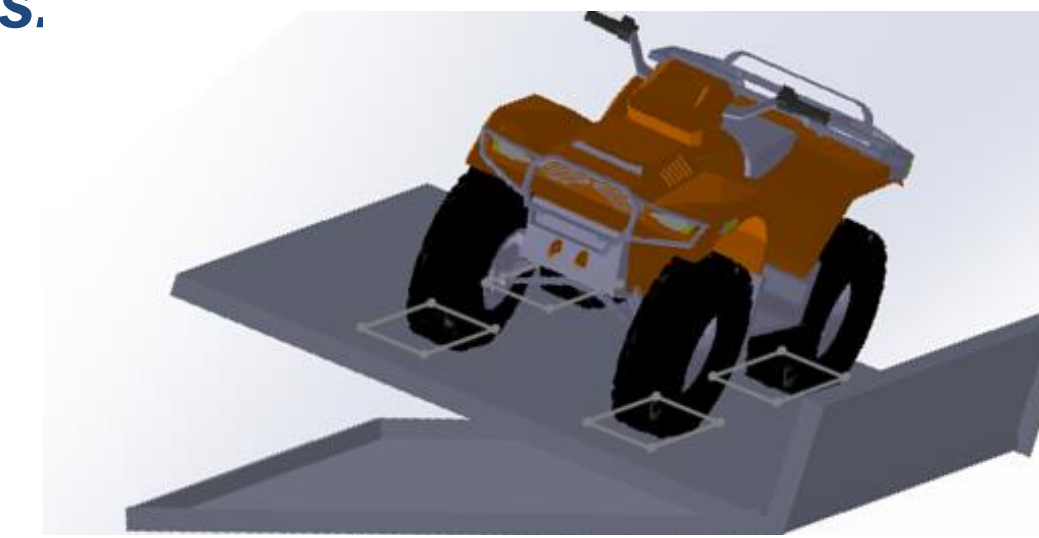
**Figure 1:** Common mismatches between child and ATV operational requirements

## Physical Capabilities of Youth ATV operators

Utility ATVs, which are commonly used for farm work, have heavyweights and fast speeds that require complex manoeuvring. Children's physical capabilities may not be sufficient to perform those manoeuvres correctly. This study aimed to understand the physical limitations that youth face when operating ATVs and how these limitations contribute to incidents. We evaluated three areas: strength, anthropometry, and field of vision. The results of this study demonstrated a physical mismatch between youth and the operational requirements of ATVs. First, the forces required to operate ATV controls typically exceeded youth's strength. Pressing the footbrake and pushing the ATV off are the most difficult tasks for ATV operation. Second, most youth failed to pass at least one ATV-rider fit recommendation proposed by the National 4-H Council. Lastly, our results showed that youth have a restricted field of vision compared to adults.

## An Analysis of the Static Stability of ATVs

Rollover crashes appear as the most recurrent type of ATV incidents. The propensity of ATV rollover crashes can be reduced by improving the vehicle's static stability. This study aims to evaluate the stability of agricultural ATVs, carrying different amounts and types of loads – solid or liquid payloads – under static conditions.



**Figure 2:** Representation of the static stability test performed in the study

## Autonomous ATVs

Crush Protection Devices (CPDs) could potentially decrease injuries and of fatalities in ATV rollovers. CPD is a passive safety structure that protects the operator in ATV rollover incidents. The effectiveness of CPDs should be evaluated experimentally with an autonomous ATV in order to conduct repeatable and accurate rollover tests. In this study, we developed an autonomous ATV with a GPS based-navigation system, a remote cruise control module, and remote braking and emergency engine shut-off systems. The autonomous ATV will be used to test various CPD modules such as the Quadbar, Lifeguard, and Quadbar Flexi in static and dynamic rollover simulations.



**Figure 3:** Quadbar and Lifeguard CPD types



**Figure 4:** Agricultural Robots

## Safety Requirements for Autonomous Agricultural Machinery

Autonomous agricultural machinery has the potential to revolutionize modern farming practices by improving efficiency, productivity, and sustainability. However, the successful integration of driver-optional machinery in agriculture depends on addressing various technological, safety, regulatory, and social challenges. This study aims to provide a comprehensive analysis of the current state of autonomous agricultural machinery, develop performance benchmarks for agricultural autonomous vehicles, and develop a well-regulated and supportive framework to test autonomous machinery and associated safety regulations in a controlled environment.