

Thesis Project Portfolio

Football Helmet: Head to Ground Test Device

(Technical Report)

Revolutionizing NFL Helmet Safety: Innovations and Impact

(STS Research Paper)

An Undergraduate Thesis

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Binh Nguyen

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Sociotechnical Synthesis

Helmet safety in football hinges on both technological advancements and regulatory adaptation. Our technical project addresses a critical gap in impact testing by refining simulations for head-to-ground (H2G) impacts, a mechanism often overlooked despite its role in concussions. Current testing standards primarily focus on direct impacts, neglecting the rotational forces that contribute to traumatic brain injuries. By developing a more accurate evaluation system, we aim to support improved helmet designs that better protect athletes.

This effort is deeply tied to the broader discussion in our STS research, which explores how helmet regulations and industry standards evolve alongside medical discoveries. Despite increased awareness of chronic traumatic encephalopathy (CTE), regulatory frameworks struggle to keep pace with the latest safety innovations. Bridging this divide requires both engineering advancements and a commitment to implementing updated testing protocols that reflect real-world conditions.

Our research highlights the interplay between scientific progress, industry adoption, and policy reform—demonstrating that true advancements in player safety depend on integrating new testing methodologies into existing standards. By ensuring that technological breakthroughs align with regulatory systems, we can drive meaningful improvements in football helmet safety and concussion prevention.