# Semantic Detection of Potential Wind-borne Debris in Construction Jobsites: Digital Twining for Hurricane Preparedness and Jobsite Safety

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## ABSTRACT

In the United States, hurricanes are the most devastating natural disasters causing billions of dollars worth of damage every year. More importantly, construction jobsites are classified among the most vulnerable environments to severe wind events. During hurricanes, unsecured and incomplete elements of construction sites, such as scaffoldings, plywoods, and metal rods, will become the potential wind-borne debris, causing cascading damages to the construction projects and the neighboring communities. Thus, it is no wonder that construction firms implement jobsite emergency plans to enforce preparedness responses before extreme weather events. However, relying on checklist-based emergency action plans to carry out a thorough hurricane preparedness is challenging in large-scale and complex site environments. For enabling systematic responses for hurricane preparedness, we have proposed a vision-based technique to identify and analyze the potential wind-borne debris in construction jobsites. Building on this, this paper demonstrates the fidelity of a new machine vision-based method to support construction site hurricane preparedness and further discuss its implications. The outcomes indicate that the convenience of visual data collection and the advantages of the machine vision-based frameworks enable rapid scene understanding and thus, provide critical heads up for practitioners to recognize and localize the potential wind-borne derbies in construction jobsites and effectively implement hurricane preparedness.