KADE Solar Mount
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The Problem

Current solar panel installations on pitched and gable roofs rely on anchors drilled into the roof. This is a time and cost intensive method and creates the potential for leaks leading to water damage. It also adds a large extra cost in the installation of solar panels since specialized people and equipment are required to attach the solar panels to the roof.

The Design

Our goal was to design a solar panel mounting system that does not penetrate the roof while reducing the need for tools and assembly time on the roof.

Our design uses a frame to create a low-profile distributed load across the roof, and 3D printed clips to secure the solar panels to the frame. An over peak assembly adds security to prevent the system from sliding off the roof.

Frame

Rails made from electrical strut extend over the peak of the roof, providing a counterbalance to gravity and wind forces on the solar panel array.

Secondary rails are clamped to the electrical strut and run horizontally across the roof. This creates a rigid structure that distributes the load over a large area which removes any point loads on the roof.

Panel Clips

The clip was designed by our project team and is designed to clip onto the edges of the panels. These 3D printed clips easily attach to the solar panels without too much struggle from the user. Once they are attached, they are secure due to the edge of the clip hooking onto the underside of the panels to prevent them from lifting up or moving.

Weather

As the structure does not utilize roof penetrating anchors, we needed to offset the effects of extreme weather events. The structure is designed to prevent wind forces from moving the mount. The low-profile prevents laminar flow under the panels, disrupting any lift generation. The weight of the structure acts as ballast against pressure differential created by snow damming, and any forces acting upwards on the panel side are offset by the counterbalance on the back side of the roof.

Figure 24. Symmetry plane velocity contour plot (Fine mesh 3D model)

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