User Manual

Overview

The structARal app (Figure 1) contains four main modules: Skywalk, Campanile, Town Building, and Catt Hall, to demonstrate construction analysis. All four modules can be viewed under three different modes: Pre-loaded, Indoor, and Outdoor. In pre-loaded mode, instruction content overlays on a static image (Figure 2). In indoor mode, instruction content overlays on physical images when pointing the device camera to the AR image target (Figure 3). In outdoor mode, instruction content overlays on physical buildings when pointing the device camera to the AR object target (Figure4).

General Interface

Modules can be accessed from the main menu (Figure 1), and each contains identical user interface to access different instruction content. The interface includes a Visualization control panel (circled in yellow) to control visualization, a drop-down menu (circled in red) to change between different tracking, a screenshots button , and a get back to the main menu button .

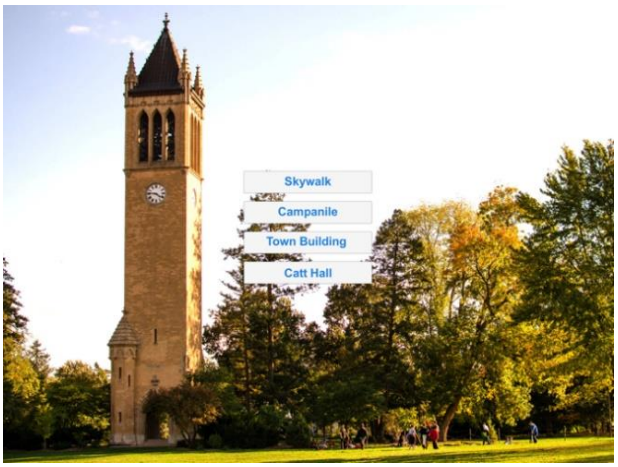

Figure 1. Main Menu

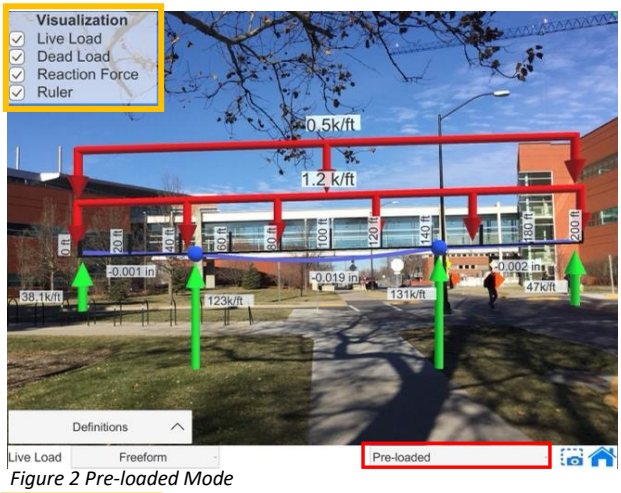

Figure 2 Pre-loaded Mode

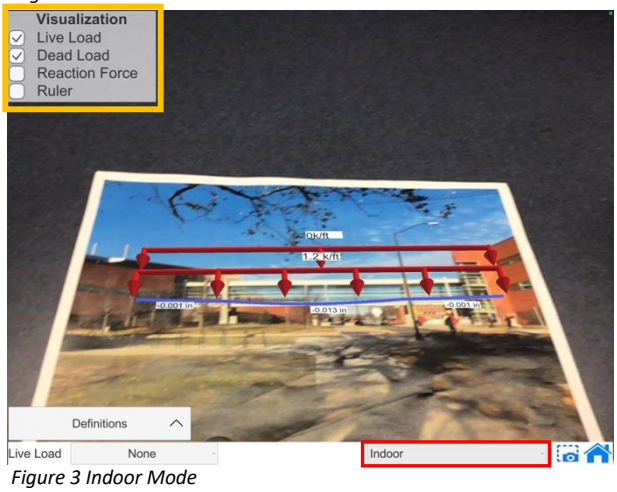

Figure 3 Indoor Mode

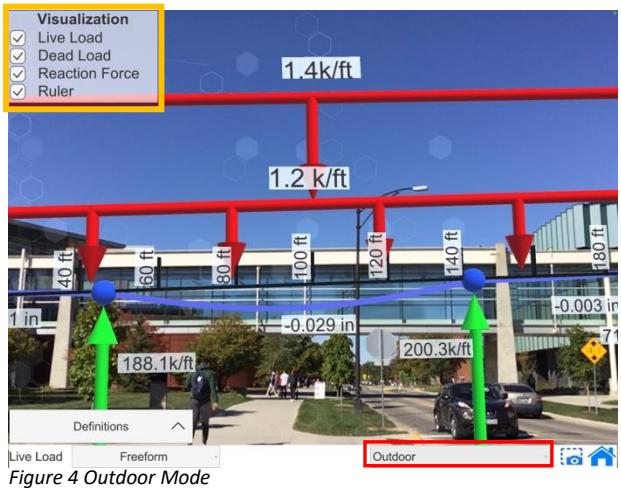

Figure 4 Outdoor Mode

Skywalk

Skywalk module analyzes deformation and reaction forces when applying live and dead load on the Skywalk. The main diagram contains:

- Visualization and the current value of live load (top red arrow).
- Visualization and the current value of dead load (second top red arrow).
- Visualization of deformation (purple lines).
- Virtual Ruler (black line).
- Visualization and the current value of reaction force (Green arrow).

The visualization control panel on top left corner contains toggle options to control the visualizations on the main diagram. Live Load location can be controlled from the bottom left dropdown menu between None, Uniform, Left side, Right side, and Freeform. The value and location of the Live Load can also be controlled by dragging the red arrow directly on the touch screen. The Definitions button can be expanded to view detailed information about the dead and live load.

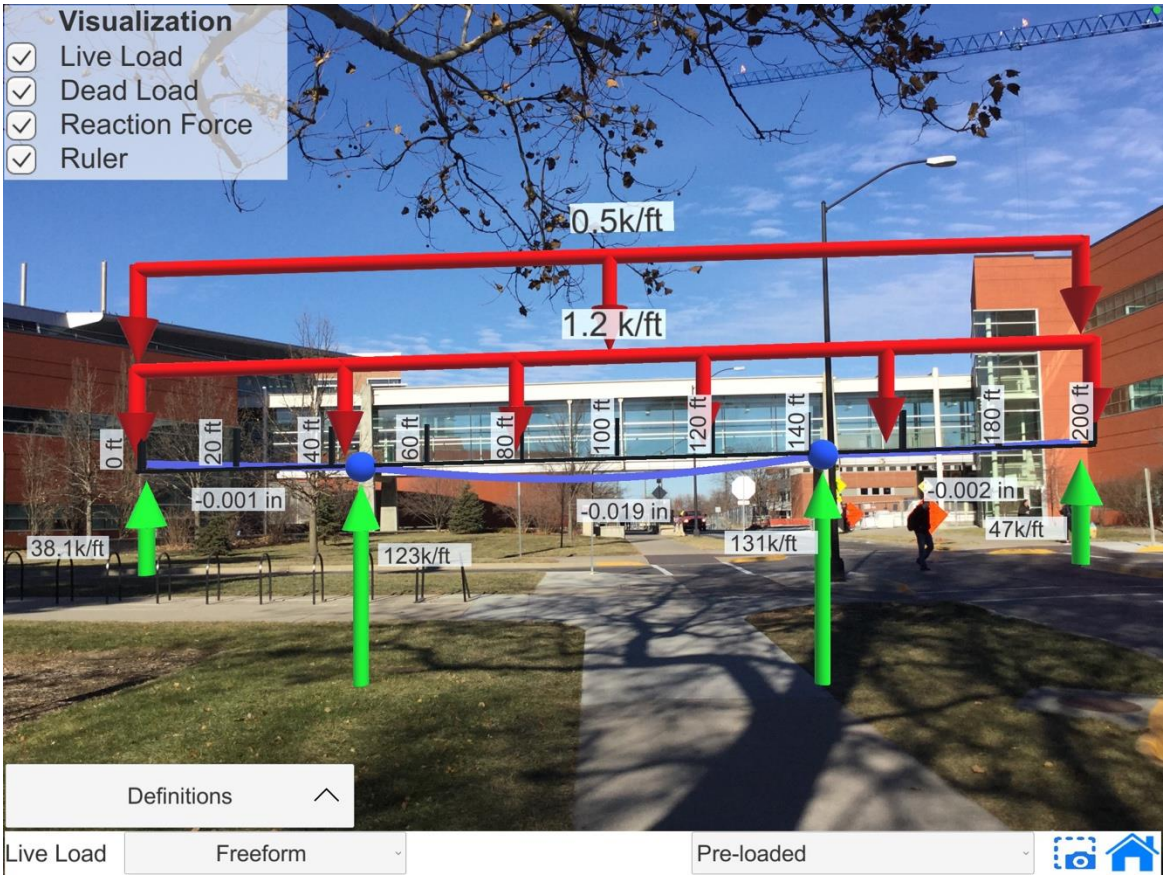

Figure 5 Skywalk

Campanile

The Campanile module analyzes deformation and reaction forces on the Campanile when applying different wind speeds or seismic intensity. The bottom dropdown menu (circled in red) can change between wind or seismic situations. In both situations, the main diagram contains:

- Visualization and the current value of top pressure (top red arrow)
- Visualization of wind pressure (red arrows on the left side of the Campanile)
- Visualization of seismic intensity (red arrows on the right side of the Campanile)
- Visualization of the deformation (purple lines)
- Model of the inner structure (yellow model)
- Visualization and the current value of the reaction forces and momentums (Green arrow)

The Visualization control panel includes toggle options which control the visualization of the inner structure model and animation (not available in wind mode). Both wind pressure and seismic intensity are controlled by the bottom left scaler or by dragging it directly on the touch screen. The Seismic mode has a Spectral Plot button that can expand to view the spectral plot for different intensity values.

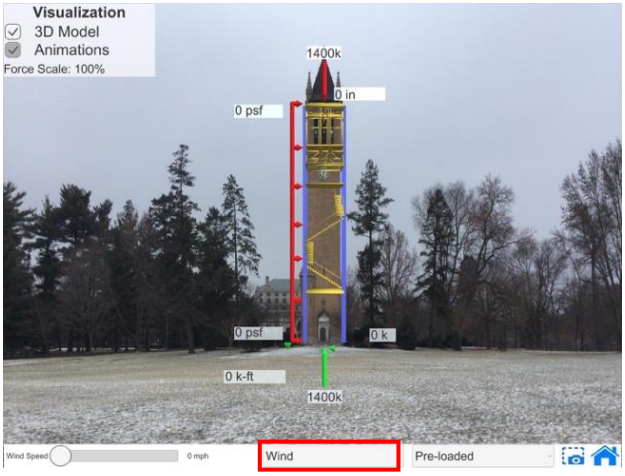

Figure 6 Campanile - Wind

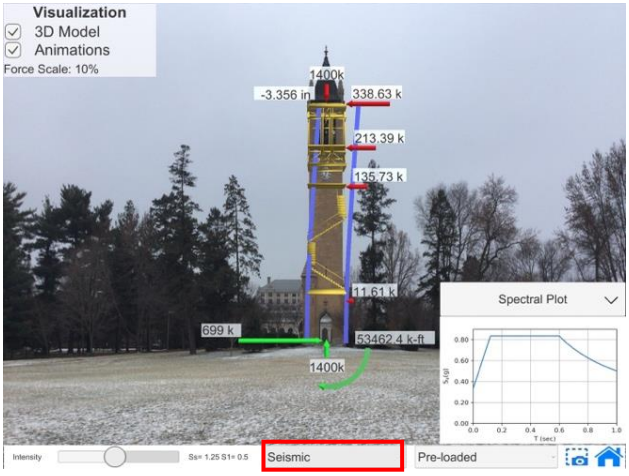

Figure 7 Campanile - Seismic

Town Building

The Town Building module analyzes deformation and reaction forces when applying wind, live, and dead load to Town building. The main diagram contains:

- Visualization and the current value of live load (top red arrow)
- Visualization and the current value of dead load (second top red arrow)
- Visualization and the current value of side wind force (left red arrow)
- Visualization of deformation (purple lines)
- Visualization and the current value of reaction force and momentum (Green arrow)
- Model of the inner structure (gray model)

The Visualization control panel includes toggle options to control the visualizations on the main diagram. Live load location and value, and wind force value, can be controlled by dragging them directly on the touch screen. The Fixed Joints diagram shows the force analysis on each fixed joint.

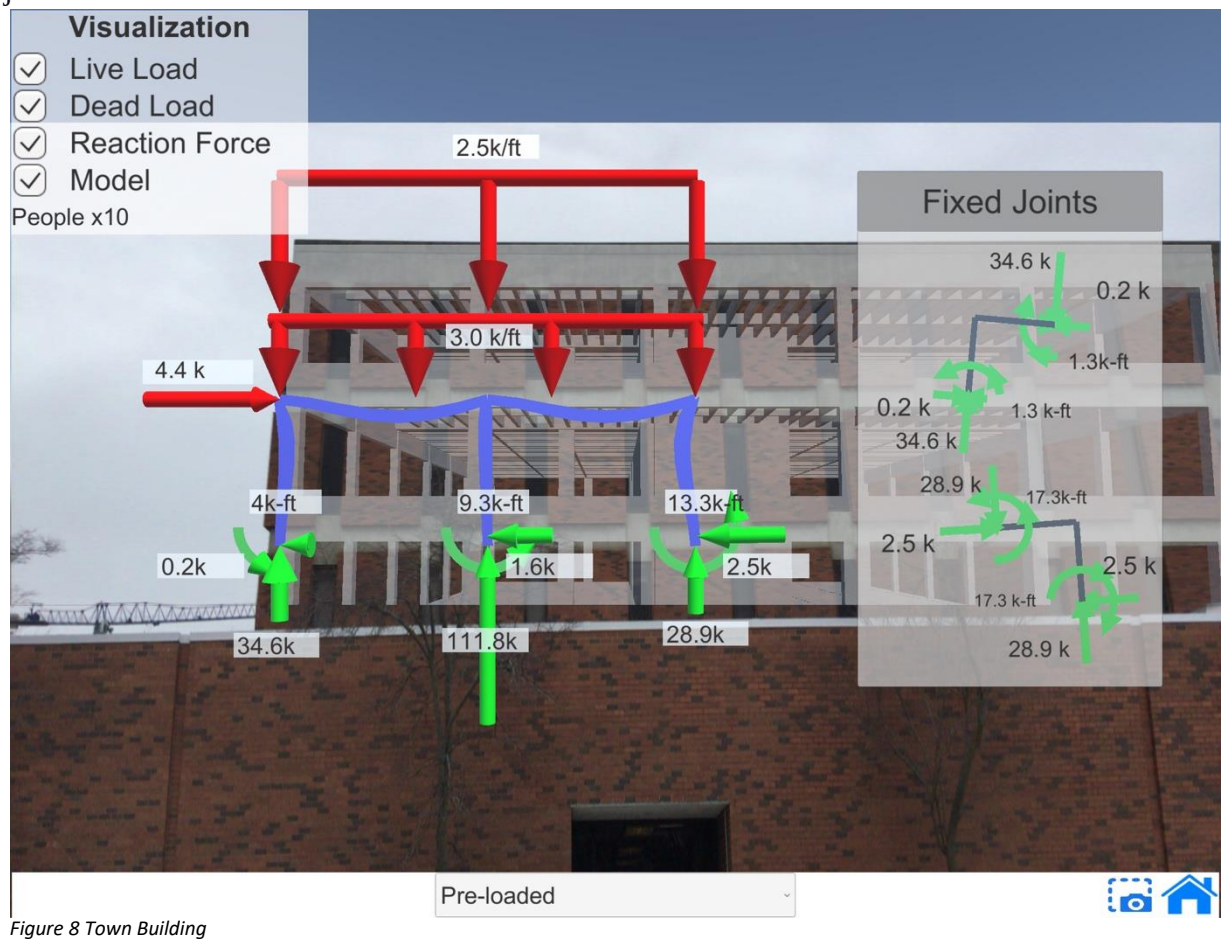

Figure 8 Town Building

Catt Hall

The Catt Hall module analyzes reaction forces on Catt Hall when applying different wind speeds and snowfall. The dropdown menu on the visualization control panel can control the loads on the building to be viewed as point load or distribution load. The main diagram contains:

- Visualization and the current value of wind force (left red arrow or yellow arrows)
- Visualization and the current value of snow load and dead load (top and second top red arrow in Distribution view)
- Visualization and the current value of the sum of snow load and dead load (purple arrow in Point view)
- Visualization of the structure (color lines)
- Visualization and the current value of the reaction forces (Green arrow)

The Visualization control panel includes toggle options to control the elements on the main diagram. Wind speed and snow depth can be controlled by the bottom scalers or dragging directly on the touch screen. Member forces diagram shows forces on different points of the structure. The Member Forces diagram shows forces on different points of the structure.

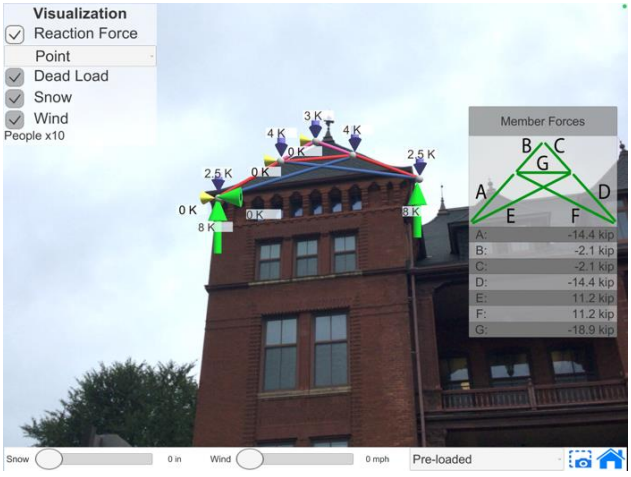

Figure 9 Catt Hall - Point

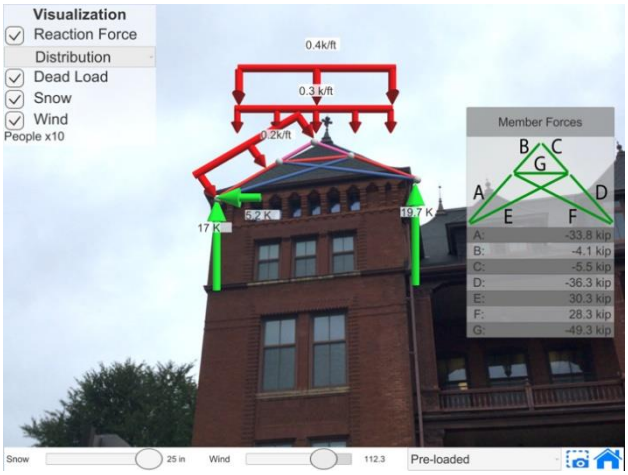

Figure 10 Catt Hall - Distribution