CLAIMS:

1. A dynamic projection mapping system, comprising:

a projector configured to project visible light;

a calibration assembly comprising a sensor configured to detect the visible light projected by the projector and an emitter configured to emit infrared light, wherein the calibration assembly is coupled to a prop;

a tracking sensor configured to detect the infrared light emitted by the emitter; and

one or more processors configured to perform a calibration to align the projector and the tracking sensor based on sensor signals received from the sensor and from the tracking sensor.

2. The dynamic projection mapping system of claim 1, wherein the sensor and the emitter are in a concentric ring arrangement.

3. The dynamic projection mapping system of claim 1, wherein the calibration assembly comprises a housing, and the emitter is positioned to circumferentially surround the sensor within the housing.

4. The dynamic projection mapping system of claim 1, the prop comprises one or more actuators configured to adjust a position of the prop.

5. The dynamic projection mapping system of claim 1, wherein the tracking sensor is configured to track the prop based on detection of one or more trackers coupled to the prop and the projector is configured to project images onto the prop as the prop moves through a show space.

6. The dynamic projection mapping system of claim 1, wherein the one or more processors are configured to establish a common origin point in a show space to align the projector and the tracking sensor.

7. The dynamic projection mapping system of claim 6, wherein the tracking sensor is configured to detect a position of the prop relative to the common origin point, and the one or

more processors are configured to instruct the projector to project images onto the prop based on the position of the prop relative to the common origin point.

8. The dynamic projection mapping system of claim 1, wherein the projector is configured to project the visible light in a first section at a first time and a second section at a second time after the first time to facilitate the calibration.

9. A dynamic projection mapping system, comprising:

a projector configured to project light;

a calibration assembly comprising a sensor configured to detect the light projected by the projector and an emitter configured to emit light, wherein the calibration assembly is coupled to a prop;

a tracking sensor configured to detect the light emitted by the emitter; and

one or more processors configured to establish a common origin within a show space for the projector and the tracking sensor based on sensor signals from the sensor and the tracking sensor.

10. The dynamic projection mapping system of claim 9, wherein the sensor and the emitter are in a concentric ring arrangement.

11. The dynamic projection mapping system of claim 9, wherein the calibration assembly comprises a housing, and the emitter is positioned to circumferentially surround the sensor within the housing.

12. The dynamic projection mapping system of claim 9, wherein the prop comprises an animated figure comprising one or more actuators configured to adjust a pose of the animated figure.

13. The dynamic projection mapping system of claim 9, wherein the tracking sensor is configured to track the prop and the projector is configured to project images onto the prop as the prop moves through a show space.

14. The dynamic projection mapping system of claim 13, wherein the tracking sensor is configured to track a position of the prop relative to the common origin point, and the one or more processors are configured to instruct the projector to project the images onto the prop based on the position of the prop relative to the common origin point.

15. The dynamic projection mapping system of claim 9, wherein the emitter is configured to emit infrared light, and the tracking sensor is configured to detect the infrared light emitted by the emitter.

16. A method of operating a projection system and an optical tracking system for dynamic projection mapping, the method comprising:

instructing, via one or more processors, a projector to project visible light;

receiving, at the one or more processors, a first sensor signal from a sensor of a calibration assembly, wherein the first sensor signal indicates receipt of the visible light at the sensor, and the calibration assembly is coupled to a prop;

instructing, via the one or more processors, an emitter of the calibration assembly to emit infrared light;

receiving, at the one or more processors, a second sensor signal from a tracking sensor, wherein the second sensor signal indicates receipt of the infrared light at the tracking sensor; and

calibrating, via the one or more processors, the projector and the tracking sensor based on the first sensor signal and the second sensor signal.

17. The method of claim 16, wherein the sensor and the emitter are co-axial.

18. The method of claim 16, comprising:

receiving, at the one or more processors, additional sensor signals from the tracking sensor;

processing, via the one or more processors, the additional sensor signals to determine a position of the prop within a show space; and

instructing, via the one or more processors, the projector to project images onto the prop based on the position of the prop within the show space.

19. The method of claim 16, comprising calibrating the projector and the tracking sensor by establishing a common origin point in a show space.

20. The method of claim 16, comprising instructing the projector to project the visible light and the emitter to emit the infrared light simultaneously.