CLAIMS

What is claimed is:

1. An apparatus comprising:

a memory storing instructions; and

a processor communicatively coupled to the memory and configured to execute the instructions to:

receive an image of a scene;

determine at least one marker within the scene;

determine a boundary of an object within the scene;

determine the boundary of the object comprises applying an image segmentation algorithm to the image;

modify the boundary based on the at least one marker; and

track a movement of the object within additional images of the scene based on the determined boundary.

2. The apparatus of claim 1, wherein the processor is configured to execute the instructions to determine that the tracked movement satisfies at least one predetermined movement based on movement data.

3. The apparatus of claim 2, wherein the processor is configured to execute the instructions to:

provide for displaying a first indication that the object is not cleaned when the at least one predetermined movement has not been satisfied; and

provide for displaying a second indication that the object is cleaned when the at least one predetermined movement has been satisfied.

~~4. The apparatus of claim 1, wherein determining the boundary of the object comprises applying an image segmentation algorithm to the image.~~

~~5.~~4. The apparatus of claim 1, wherein the processor is configured to execute the instructions to detect at least one marker within the image, wherein determining the boundary of the object is based on the detected at least one marker.

~~6.~~5. The apparatus of claim 1, wherein determining the boundary of the object comprises:

determining an area of the image that comprises the marker; and

combining the area of the image with the boundary of the object to generate an adjusted boundary for the object.

~~7.~~6. The apparatus of claim 5~~6~~, wherein determining the area of the image that comprises the marker comprises:

generating at least one virtual marker for the image based on market configuration data; and

determining the area of the image based on the at least one virtual marker.

~~8.~~7. The apparatus of claim 1 wherein the processor is configured to execute the instructions to:

determine that the tracked movement fails to satisfy at least one predetermined movement based on movement data; and

provide for display an indication that the object has not been cleaned.

~~9.~~8. The apparatus of claim 1 wherein the processor is configured to execute the instructions to:

detect a surface in the image;

determine at least a portion of the surface that coincides with the object; and

determine that the at least portion of the surface has been cleansed by the object.

~~10.~~9. The apparatus of claim ~~8~~9, wherein determining the at least portion of the surface that coincides with the object comprises determining that first pixels of the image that correspond to the at least portion of the surface coincides with second pixels of the image that correspond to the object.

~~11.~~10. A method by at least one processor comprising:

receiving an image of a scene;

determining at least one marker within the scene;

determining a boundary of an object within the scene;

determining the boundary of the object comprises applying an image segmentation algorithm to the image;

modifying the boundary based on the at least one marker; and

tracking a movement of the object within additional images of the scene based on the determined boundary.

~~12.~~11. The method of claim 10~~11~~ comprising determining that the tracked movement satisfies at least one predetermined movement based on movement data.

~~13.~~12. The method of claim 11~~12~~ comprising:

providing for display a first indication that the object is not cleaned when the at least one predetermined movement has not been satisfied; and

providing for display a second indication that the object is cleaned when the at least one predetermined movement has been satisfied.

~~14.~~13. The method of claim 10~~11~~, wherein determining the boundary of the object comprises applying an image segmentation algorithm to the image.

~~15.~~14. The method of claim 10~~11~~ comprising detecting at least one marker within the image, wherein determining the boundary of the object is based on the detected at least one marker.

~~16.~~15. A non-transitory, computer readable medium comprising instructions stored thereon, wherein the instructions, when executed by at least one processor, cause the at least one process to perform operations comprising:

receiving an image of a scene;

determining at least one marker within the scene;

determining a boundary of an object within the scene;

determining the boundary of the object comprises applying an image segmentation algorithm to the image;

modifying the boundary based on the at least one marker; and

tracking a movement of the object within additional images of the scene based on the determined boundary.

~~17.~~16. The non-transitory, computer readable medium of claim 15~~16~~, wherein the performed operations comprise determining that the tracked movement satisfies at least one predetermined movement based on movement data.

~~18.~~17. The non-transitory, computer readable medium of claim 15~~16~~, wherein the performed operations comprise:

providing for display a first indication that the object is not cleaned when the at least one predetermined movement has not been satisfied; and

providing for display a second indication that the object is cleaned when the at least one predetermined movement has been satisfied.

~~19.~~18. The non-transitory, computer readable medium of claim 15~~16~~, wherein the performed operations comprise applying an image segmentation algorithm to the image.

~~20.~~19. The non-transitory, computer readable medium of claim 15~~16~~, wherein the performed operations comprise detecting at least one marker within the image, wherein determining the boundary of the object is based on the detected at least one marker.

~~21.~~20. An apparatus comprising:

a memory storing instructions; and

a processor communicatively coupled to the memory and configured to execute the instructions to:

receive an image from a camera directed to a sink;

determine a location of a hand based on the image;

determine a hand movement is satisfied based on the location of the hand;

determine whether the hand is sanitized based on the hand movement; and

generate and store data based on the determination of whether the hand is sanitized.

~~22.~~21. The apparatus of claim 20~~21~~, wherein determining the hand movement is satisfied comprises determining an orientation of the hand based on the image, and comparing the orientation of the hand to a second image characterizing the hand movement.

~~23.~~22. An apparatus comprising:

a sensor;

a motor;

a memory storing instructions; and

a processor communicatively coupled to the sensor, to the motor, and to the memory, and configured to execute the instructions to:

receive sensor data from the sensor characterizing a movement;

based on the sensor data, provide a first signal to the motor to cause the dispensing of a sanitizing solution; and

provide a second signal to the motor to cause the dispensing of the sanitizing solution to cease.

~~24.~~23. The apparatus of claim 22~~23~~, wherein the dispensing of the sanitizing solution is to a back of a hand.

~~25.~~24. An apparatus comprising:

a memory storing instructions; and

a processor communicatively coupled to the memory and configured to execute the instructions to:

receive a first image;

determine a first object in a room based on the first image;

receive a second image;

determine a second object in the room based on the second image;

determine the first object has contaminated the second object;

generate contamination graph data characterizing that the first object has contaminated the second object; and

store the contamination graph data in a database.

~~26.~~25. The apparatus of claim 24~~25~~, wherein determining the first object has contaminated the second object comprises determining the first object has touched the second object.

~~27.~~26. The apparatus of claim 24~~25~~, wherein determining the first object has contaminated the second object comprises determining the first object has come within a distance of the second object.

~~28.~~27. The apparatus of claim 26~~27~~, wherein determining the first object has contaminated the second object comprises determining the first object is within an airflow distance of the second object.