shown in FIG. **1**. The diffuser screen layer **622** can serve to reduce or avoid the imaging of objects that are not in contact with or positioned within a few millimeters or other suitable distance of display screen **614**, and therefore helps to ensure that at least objects that are touching the display screen **614** are detected by the image capture devices. While the disclosed embodiments are described in the context of a vision-based multi-touch display system, it will be understood that the embodiments may be implemented on any other suitable touch-sensitive display system, including but not limited to capacitive and resistive systems.

[0032] The image capture devices may include any suitable image sensing mechanism. Examples of suitable image sensing mechanisms include but are not limited to CCD and CMOS image sensors. Further, the image sensing mechanisms may capture images of the display screen **614** at a sufficient frequency or frame rate to detect motion of an object across the display screen **614**. In other embodiments, a scanning laser may be used in combination with a suitable photodetector to acquire images of the display screen **614**. Display screen **614** may alternatively or further include an optional capacitive, resistive or other electromagnetic touch-sensing mechanism, which may communicate touch input to the logic subsystem via a wired or wireless connection **638**.

[0033] The image capture devices may be configured to detect reflected or emitted energy of any suitable wavelength, including but not limited to infrared and visible wavelengths. To assist in detecting objects placed on display screen **614**, the image capture devices may further include an illuminant, such as one or more light emitting diodes (LEDs). FIG. **6** shows an infrared light source **640** and an infrared light source **642** configured to produce infrared light. Light from the illuminant may be reflected by objects contacting or near display screen **614** and then detected by the image capture devices. The use of infrared LEDs as opposed to visible LEDs may help to avoid washing out the appearance of projected images on display screen **614**.

[0034] In some examples, one or more of infrared light source **640** and/or infrared light source **642** may be positioned at any suitable location within surface computing system **610**. In the example of FIG. **6**, an infrared light source **642** may be placed along a side of display screen **614**. In this location, light from the infrared light source can travel through display screen **614** via internal reflection, while some light can escape from display screen **614** for reflection by an object on the display screen **614**. In other examples, an infrared light source **640** may be placed beneath display screen **614**. Accordingly, infrared light source **640** and/or infrared light source **642** may be configured to interact with logic subsystem **624** and/or data-holding subsystem **626** to perform operations of a reference engine, such as reference engine **108** shown in FIG. **1**.

[0035] It will be understood that the surface computing system **610** may be used to detect any suitable physical object, including but not limited to, fingers, styluses, cell phones, cameras, other portable electronic consumer devices, barcodes and other optically readable tags, etc.

[0036] Logic subsystem **624** may include one or more physical devices configured to execute one or more instructions. For example, the logic subsystem may be configured to execute one or more instructions that are part of one or more programs, routines, objects, components, data structures, or other logical constructs. Such instructions may be implemented to perform a task, implement a data type, transform the state of one or more devices, or otherwise arrive at a desired result. The logic subsystem may include one or more processors that are configured to execute software instructions. Additionally or alternatively, the logic subsystem may include one or more hardware or firmware logic machines configured to execute hardware or firmware instructions. The logic subsystem may optionally include individual components that are distributed throughout two or more devices, which may be remotely located in some embodiments.

[0037] Data-holding subsystem **626** may include one or more physical devices configured to hold data and/or instructions executable by the logic subsystem to implement the herein described methods and processes. When such methods and processes are implemented, the state of data-holding subsystem **626** may be transformed (e.g., to hold different data). Data-holding subsystem **626** may include removable media and/or built-in devices. Data-holding subsystem **626** may include optical memory devices, semiconductor memory devices, and/or magnetic memory devices, among others. Data-holding subsystem **626** may include devices with one or more of the following characteristics: volatile, nonvolatile, dynamic, static, read/write, read-only, random access, sequential access, location addressable, file addressable, and content addressable. In some embodiments, logic subsystem **624** and data-holding subsystem **626** may be integrated into one or more common devices, such as an application specific integrated circuit or a system on a chip.

[0038] Data-holding subsystem **626** may be in the form of computer-readable removable media, which may be used to store and/or transfer data and/or instructions executable to implement the herein described methods and processes.

[0039] The terms "module" and "engine" may be used to describe an aspect of computing system **610** that is implemented to perform one or more particular functions. In some cases, such a module or engine may be instantiated via logic subsystem **624** executing instructions held by data-holding subsystem **626**. It is to be understood that different modules and/or engines may be instantiated from the same application, code block, object, routine, and/or function. Likewise, the same module and/or engine may be instantiated by different applications, code blocks, objects, routines, and/or functions in some cases. Further, a module or engine may include other hardware, firmware, and/or software. Examples of such engines include a touch module, a reference engine, a touch-detection engine, an imaging engine, a topography-changing engine, etc.

[0040] An above-described display subsystem of computing system **610** may be used to present a visual representation of data held by data-holding subsystem **626**. As the herein described methods and processes change the data held by the data-holding subsystem, and thus transform the state of the data-holding subsystem, the state of the display subsystem may likewise be transformed to visually represent changes in the underlying data. The display subsystem may include one or more display devices utilizing virtually any type of technology. Such display devices may be combined with logic subsystem **624** and/or data-holding subsystem **626** in a shared enclosure, or such display devices may be peripheral display devices.

[0041] It is to be understood that the configurations and/or approaches described herein are exemplary in nature, and that these specific embodiments or examples are not to be considered in a limiting sense, because numerous variations are possible. The specific routines or methods described herein may represent one or more of any number of processing