undesirable when the three-dimensional calibration equipment **340** is used in a security or a surveillance application.

**[0145]** Referring now to FIG. **48**, a ninth exemplary embodiment of the three-dimensional calibration equipment **354** is depicted. The three-dimensional calibration equipment **354** includes a stereoscopic microscope **356**, optical recorders **358***a*, **358***b* a light source **360**, and a holographic calibration plate **362**. FIG. **48** shows an apparatus which generates virtual holograms for the stereoscopic microscope **356**. Calibration of the stereoscopic microscope **356** can be useful when multiple optical paths **362***a*, **362***b* are employed. Potential uses of calibration for the stereoscopic microscope **356** include projecting three-dimensional grids in the field of view of the lenses **364***a*, **364***b* of the stereoscopic microscope **356** to assist in counting specimens such as while blood cells on microscope slides **366** or to ascertain the locations of imperfections in diamonds as a means of grading and identification in the case of theft. The use of three-dimensional holograms permits improved analysis as stereoscopic microscope images are scaled, especially in the depth dimension. When multiple virtual calibration patterns (not shown) are recorded by the optical recorders **358***a*, **358***b* on the holographic calibration plate **362** after being illuminated by an optical source **360**, the multiple virtual calibration patterns are selectively accessed as the wavelength of illumination of the holographic calibration plate **360** is varied or by movement of the holographic calibration plate **360**. For the three-dimensional calibration equipment **354**, one calibration wavelength is used to record a virtual calibration pattern and another calibration wavelength is used to symbolically identify the pattern (grid) intersection, e.g. a bar code or alphanumeric sequence. Additional wavelengths are used for illuminating holographic calibration grids (virtual calibration patterns) with finer grid structures for more accurate determination of three-dimensional spatial positioning. Combining the holographic calibration plate **360** with a holographic calibration grid with marked symbolic identification such a bar code decreases the time for real time recognition of grid intersections by commercial software.

**[0146]** Referring now to FIG. **49**, a tenth exemplary embodiment of the three-dimensional calibration equipment **368** is depicted. The three-dimensional calibration equipment **368** includes a light source **370** which excites the holographic calibration pattern, a holographic calibration plate **372** that contains holographic encoded calibration information, two or more optical recorders **374***a*-**374***c* which acquire images in different optical wavelengths. The light source **370** may be placed on either side of the holographic calibration plate **372**. This embodiment projects holographic calibration patterns into the field of view of multiple optical recorders which acquire images in different optical wavelengths in order to capture multiple views referenced to common calibration patterns. The three-dimensional calibration equipment **368** is used for identifying the desired object **378** using a combination of characteristics. For example, these characteristics include unique object identifiers (e.g. finger prints), object geometry (e.g. hand geometry) and/or object substructures (e.g. veins viewed at non-visible wavelengths). The wavelength selective filters **202** and **204** enhance selection of identification characteristics. For example, a band stop filter which only passes the infrared wavelengths is most useful for vein identification. The filters may be selected in real time using opto-acoustic implementations for the wavelength selective filters to select a particular eye or hair color corresponding to a specific desired object(s) **378** for which an identification is desired. The three-dimensional calibration equipment **368** minimizes post processing by the use of band pass and band stop optical filters and/or continuous holographic calibration and correction, which speeds up the matching of the desired object **378**.

**[0147]** The exemplary embodiment of the three-dimensional calibration equipment **368** can be employed in banking where the underlying identification objectives are to: (1) minimize false acceptances and (2) minimize false rejections. The multi-criteria identification system shown in FIG. **49** can apply low false rejection criteria (e.g. hand geometry) to low risk activities (e.g. balance checks) and apply low false acceptance criteria (finger print, vein structure, etc.) to high cost of failure activities (e.g. funds withdrawal).

**[0148]** The present invention has several advantages over the prior art three-dimensional imaging system. For the three-dimensional display **12**, when ultra short optical pulses are employed, the ultra short optical pulses converge at very precise locations on the optical mixer **18**, thereby creating high precision, high definition images in the display volume **28**. The optical mixer elements **20***a*-**20***i* can be varied in size, allowing the three-dimensional display **12** to be scalable from very small to very large displays. There is no inherent size limitation. The optical mixer element layout can be optimized to prevent unintended pulse overlap from creating unintended outputs. The optical mixer **18** is capable of being viewed at high refresh rates. Since the three-dimensional display **12** is operable using optical pulses **32***a*-**32***k* that are in visible and non-visible wavelengths, the three-dimensional display **12** can be used as test equipment for both the three-dimensional image scanner **14** and the two-dimensional image scanner **15**. The display electronics **24** allows for (i) the simultaneous excitement of voxels in the display volume, (ii) dynamic adjustment of the intensity of the light produced in a voxel in the display volume **28**, and (iii) the selection of optical source combinations for each voxel. These three characteristics of the display electronics **24** achieve the needed conversion efficiency in the optical mixer **18** to produce equalization of intensity throughout the display volume **28**. Using intense optical pulses **32***a*-**32***k* to excite the optical mixer **18** increases voxel intensity in the display volume **28** and thereby increases viewing angles, including angles close to the plane of the display **12**. Increased viewing angle is also achieved when the optical mixer elements **20***a*-**20***i* employ lenses, since the cone of acceptance of each of the optical mixer elements **20***a*-**20***i* increases over an element without a lens. Using optical mixer elements **20***a*-**20***i* without filters reduces the cost of the overall optical mixer **18**.

**[0149]** Compared to three-dimensional image scanners in the prior art, which capture only shape, the three-dimensional image scanner **14** captures shape, color and texture simultaneously in real-time.

**[0150]** The three-dimensional calibration equipment herein described provides continuous (real time) calibration of stereoscopic information from still or moving objects. It improves the quality of the stereoscopic images and permits the construction of more accurate three-dimensional models from such images. The three-dimensional calibration equipment can operate in real time, for both optical and electronic based optical recorders. The three-dimensional calibration equipment improves the quality of the stereoscopic images,