What is claimed is:

1. A confocal sensor for measuring height of a point on an object, the sensor comprising:

a light source;

a light source modulator configured to temporally modulate the light source intensity;

a source pinhole aperture positioned to be illuminated by the light source;

a focus-tunable lens configured to focus illumination passing through the source pinhole aperture onto the object;

a detector pinhole aperture configured to receive reflected light from the object, wherein the focus-tunable lens is configured to image the reflected light from the object onto the detector pinhole aperture;

a detector and an integrator configured to output a measurement indicative of total light transmitted through the detector pinhole aperture;

a processor operably coupled to the detector, integrator, and light source modulator, wherein the processor is configured to synchronously cause the light source modulator to modulate light source intensity while causing the focus tunable lens to sweep axial focal position, wherein either:

a) the confocal sensor is a single point confocal sensor, or

b) the confocal sensor is a three-dimensional confocal sensor for measuring height of an array of points on the object, and

the source pinhole aperture and detector pinhole aperture being a pinhole aperture array configured to be illuminated by the light source and receive reflected light from the object, and

the detector and integrator being a camera detector configured to receive reflected light from the object imaged onto the pinhole aperture array by the focus-tunable lens and to provide an output measurement indicative of total transmitted light through the pinhole aperture array for each point in the array of points;

the processor being operably coupled to the camera detector, the processor being configured to synchronously cause the light source modulator to modulate light source intensity while causing the focus modulator to sweep axial focus position..

2. The confocal sensor of claim 1, wherein the processor is further configured to:

calculate a height of the point on the object based on the output from the detector and integrator;

or

calculate a height of each point in the array of points based on the output from the camera detector.

3. The confocal sensor of claim 2:

wherein during a first integration period, the processor is configured to control the light source modulator to modulate the light source at a first phase and first frequency while synchronously causing the focus-tunable lens to sweep axial focal position through a focus range, the processor being configured to read and store the integrator output for the first integration period and then reset the integrator;

wherein during a second integration period, the processor is configured to control the light source modulator to modulate the light source at a second phase and first frequency while synchronously causing the focus-tunable lens to sweep axial focal position through the focus range, the processor being configured to read and store the integrator output for the second integration period and then reset the integrator;

wherein during a third integration period, the processor is configured to control the light source modulator to modulate the light source at a third phase and first frequency while synchronously causing the focus-tunable lens to sweep axial focal position through the focus range, the processor being configured to read and store the integrator output for the third integration period; and

wherein the processor is configured to compute a phase of the light source corresponding to focus position based on the first, second, and third integrator outputs and to convert the phase of light source to a height of the point on the object.

4. The confocal sensor of claim 1, wherein the light source is a light emitting diode, a laser, or an incandescent source.

5. The confocal sensor of claim 1, wherein the focus-tunable lens is mechanically scanned by a voice coil or is mechanically scanned by a linear stage.

6. The confocal sensor of claim 1, wherein the focus-tunable lens is a liquid lens.

7. The confocal sensor of claim 6, wherein focus of the liquid focus-tunable lens is adjusted by electrostatically changing curvature of a liquid lens surface.

8. The confocal sensor of claim 1, wherein the temporal modulation is based on Gray codes, ramps, or Hamiltonian codes.

9. The confocal sensor of claim 1, wherein the temporal light source modulation is a periodic function.

10. The confocal sensor of claim, wherein the periodic function is a sinusoidal function.

11. The confocal three-dimensional sensor of claim 1, wherein the pinhole aperture array is a moving pinhole aperture array.

12. The confocal three-dimensional sensor of claim 11, wherein the moving pinhole aperture array is a spinning Nipkow disk.

13. The confocal three-dimensional sensor of claim 1, wherein the camera detector is a complementary metal-oxide semiconductor (CMOS) area array having a two-dimensional array of pixels.

14. The confocal three-dimensional sensor of claim 1, wherein the camera detector is a charge coupled device (CCD) area array having a two-dimensional array of pixels.