CLAIMS

1. A cannula locator device, comprising:

a catheter adapter comprising an intravenous catheter;

a cannula disposed within the intravenous catheter, wherein the cannula comprises a distal tip, a proximal end, an elongated tubular shaft, and an inner lumen formed by the elongated tubular shaft and aligned with a central axis of the cannula;

a light-emitting optical fiber disposed within the inner lumen of the cannula, wherein the light-emitting optical fiber comprises a first distal end and a first proximal end, wherein the light-emitting optical fiber is configured to move past the distal tip of the cannula and emit light;

a light detector, wherein the light detector is disposed within the inner lumen of the cannula, wherein the light detector comprises light-receiving optical fibers, wherein each of the light-receiving optical fibers comprise a second distal end and a second proximal end, wherein the proximal ends of each of the light-receiving optical fibers are coupled with a camera, wherein the light-receiving optical fibers are configured to receive reflected light emitted from the light-emitting optical fiber and reflected by an environment of the distal tip of the cannula, wherein the camera is configured to generate an image;

a needle shield coupled with the catheter adapter; and

a needle hub disposed within the needle shield and coupled with the proximal end of the cannula, wherein the light-emitting optical fiber and the light-receiving optical fiber are fixed with respect to the needle hub such that in response to proximal movement of the needle hub within the needle shield, the distal tip of the cannula and the first distal end of the light-emitting optical fiber and the second distal end of the light-receiving optical fiber are configured to be retracted into the needle shield.

2. The cannula locator device of claim 1, wherein the light-receiving optical fiber is movable past the distal tip of the cannula.

3. The cannula locator device of claim 1, wherein the first and second distal ends are aligned with the distal tip of the cannula.

4. The cannula locator device of claim 3, wherein the light-emitting optical fiber and the light-receiving optical fibers are spaced apart from an inner wall of the elongated tubular shaft.

5. The cannula locator device of claim 1,

wherein the second proximal end of each of the light-receiving optical fibers is coupled with a wavelength detector, wherein the wavelength detector is configured to convert the reflected light into an electrical signal, wherein the wavelength detector is coupled with a signal processor, wherein the signal processor is configured to determine a color of the reflected light.