CLAIMS :

1. An intravenous therapy system, comprising:

a processor;

a data storage device; and

a handheld ultrasound probe to detect a blood vessel within a patient's body, the handheld ultrasound probe comprising:

a video display device physically and operatively coupled to the handheld ultrasound probe, wherein the video display device is configured to display the blood vessel;

a magnetic field detector configured to determine a position of a needle of a vascular access device (VAD) and provide closed-loop feedback indicating whether a projected path of the needle is within the blood vessel detected by the ultrasound probe;

a VAD chassis communicatively coupled to the processor and configured to receive data descriptive of a linear trajectory of a VAD when the VAD is loaded withing the VAD chassis; and

a linear motor configured to automatically advance the VAD, when the VAD is loaded in the VAD chassis, into the patient's body along the linear trajectory that does not intersect with the ultrasound probe.

2. The intravenous therapy system of claim 1, further comprising a VAD advancement system to advance the needle into the patient's body automatically using the linear motor.

3. The intravenous therapy system of claim 1, wherein the handheld ultrasound probe identifies, on the video display, a vein via a transverse planar image of the blood vessel within the patient's body.

4. The intravenous therapy system of claim 1, further comprising a VAD recommendation module configured to receive data about the blood vessel to be accessed and provide, via the video display, a visual recommendation of which of a plurality of different VADs are to be used to access the blood vessel.

5. The intravenous therapy system of claim 1, wherein the video display device presents a mapping of blood vessels within the patient's body and maintains that mapping within the data storage device.

6. The intravenous therapy system of claim 1, wherein the video display device provides a coronal planar view of the blood vessels within the patient's body depicting the projected path of the needle within the patient's body and a transverse planar view depicting projected path of the needle within the patient's body.

7. The intravenous therapy system of claim 1, further comprising an audio feedback device, a haptic feedback device, or visual feedback to indicate in response to the needle being inserted into the blood vessel within the patient's body is not projected to be positioned within a blood vessel or is projected to be positioned within a blood vessel.

8. A blood vessel detection system comprising:

a handheld blood vessel detection device, comprising:

an ultrasound probe to detect blood vessels within a patient's body,

a display device to provide a visual display of the blood vessels within the patient's body;

a vascular access device (VAD) chassis configured to receive a VAD; and

a linear motor configured to automatically advance the VAD when loaded in the VAD chassis into the patient's body along a linear trajectory that does not intersect with the ultrasound probe.

9. The blood vessel detection system of claim 8, further comprising an augmented reality headset to project to a clinician an augmented view of the blood vessels within the patient's body detected by the ultrasound probe and placement of the VAD relative to the patient's body.

10. The blood vessel detection system of claim 8, further comprising an electronic health record (EHR) system communicatively coupled to the handheld blood vessel to record images of a map of the patient's blood vessels and placement of the VAD within the patient's body.

11. The blood vessel detection system of claim 8, wherein the handheld blood vessel detection device further comprises an axial motor and a rotational motor to change an axial and rotative direction of the VAD.

12. The blood vessel detection system of claim 8, further comprising a power supply electrically coupled to the handheld device.

13. The blood vessel detection system of claim 8, further comprising a linear motor actuation button on the ultrasound probe device.

14. The blood vessel detection system of claim 8, further comprising an analysis module to:

detect the blood vessels within the patient's body;

define the geometry of the blood vessels;

create a feedback fence around the defined geometry of the blood vessels; and

provide feedback, via a feedback device, indicating when a trajectory of the VAD into and within the patient's body is projected to be positioned within a blood vessel or is not projected to be positioned within the blood vessel.

15. The blood vessel detection system of claim 14, wherein the feedback fence is defined by execution of an algorithm or input received at the display device indicating the geometry of the blood vessels.