This robust, turnkey mixed reality simulator simulates part of an anatomically correct rectum, prostate and perineum for practicing, learning, teaching and debriefing transrectal ultrasound guided (TRUS) and transperineal (TP) prostate biopsy (PBx). Designed for austere environments, it does not require wireless or internet access or wet fluids; accepts 110/220V, 50—60Hz. It can be unpacked and set up by a person unfamiliar with it and be operational in 5-7 minutes. The portable simulator fits inside a military-spec padded case with inbuilt wheels and telescoping pull-handle that meets airline checked luggage size limits (L+W+H=60”) and weighs less than 50 lbs. See more: https://simulation.health.ufl.edu/technology-development/augmented-reality-mixed-simulation/trus-pbx-sim/

TRUS side-fire (decubitus, supine, etc.): Templated, targeted, saturation, cognitive fusion with sagittal and optional transverse insonation planes
TRUS end-fire (decubitus, supine, etc.): Templated, targeted, saturation, cognitive fusion with sagittal insonation plane
Transperineal prostate biopsy (supine): Templated, targeted, saturation, cognitive fusion with sagittal and transverse insonation planes

Components:
- Virtual model of the anatomy of the prostate, urethra, bladder, seminal vesicles
- Tracked interoperable instruments: TRUS probe, needle, ultrasound probe, virtual camera
- Common SMARTS modular stand for use with other modular anatomies
- Automated scoring and replay system
- Cognitive aids, 3D visualization and instructional materials such as online videos

Technology:
- Adheres to SMARTS (System of Modular Augmented Reality Tracking Simulators) rapid sim. development platform specs
- Quick-release placement and indexing of SMARTS-compliant anatomies to SMARTS platform
- Anatomically correct virtual and physical models in the prostate library, based on medical imaging scans of real humans
- Precise sub-millimeter tracking of all tracked tools
- High-durability skin can be rejuvenated in-situ for indefinite re-use
- Three insonation planes are simulated in the BK 8818 TRUS probe: sagittal side-fire, transverse side-fire, sagittal end-fire

Features:
- Toggle visibility of anatomical structures
- 3D visualization of prostate and template locations
- Ultrasound probe with 6DOF
- Cognitive aids for locations of colored dots in template
- Needle stop line coaches insertion of biopsy needle
- Virtual lesion placement
- Cognitive aids for probe and needle orientation
- Tactile feedback of perforating prostate
- Debriefing with instant replay of past procedure
- Patient groans in pain if TRUS moved with needle in