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Electric Potential and Electric Field Imaging with Applications

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The technology and techniques for remote quantitative imaging of electrostatic potentials and electrostatic fields in and around objects and in free space is presented. Electric field imaging (EFI) technology may be applied to characterize intrinsic or existing electric potentials and electric fields, or an externally generated electrostatic field may be used for “illuminating” volumes to be inspected with EFI. The baseline sensor technology, electric field sensor (e-sensor), and its construction, optional electric field generation (quasi-static generator), and current e-sensor enhancements (ephemeral e-sensor) are discussed. Demonstrations for structural, electronic, human, and memory applications are shown. This new EFI capability is demonstrated to reveal characterization of electric charge distribution, creating a new field of study that embraces areas of interest including electrostatic discharge mitigation, crime scene forensics, design and materials selection for advanced sensors, dielectric morphology of structures, inspection of containers, inspection for hidden objects, tether integrity, organic molecular memory, and medical diagnostic and treatment efficacy applications such as cardiac polarization wave propagation and electromyography imaging.