Imaging Conductivity - High sensitivity with Quantum Technology

Device which can detect/image electrically conductive objects

Proof-of-principle experiments on metals and salt-water

Conductive object

Eddy currents

device

Figure 1: Induction of eddy currents in a conductive object such as metal or biological material.

Figure 2: Proof-of-principle detection of eddy currents in salt-water (as a proxy for biological material).

Quantum Technology

Figure 3: The magnetic field sensor is based on atomic/quantum physics. Key components include a cesium vapor cell (see picture on the right) and a laser system.

Value Proposition

• Our device can detect and image electrically conductive objects.
• The method is non-destructive. The device is placed at a distance from the object to be imaged.
• Key features: improved signal-to-noise ratio and high sensitivity => fast detection of high and low conductivity objects.

Business Opportunity/Objective/Commercial Perspectives

Detection, imaging and characterisation of conductive objects is of interest for
• industry, for detecting cracks or defects in surfaces of metals or other high-conductivity materials
• geophysics, for underground exploration and localisation of hidden objects
• bio-medical devices, for imaging biological tissue (including the heart), potentially a tool for medical diagnostics.

Technology Description/Technology Summary

The device works by inducing and detecting eddy currents in the conductive object to be imaged. It exposes the object to an oscillating magnetic field (kHz or MHz) which induces eddy currents in the object. The eddy currents are then detected with the internal magnetometer to yield information about the conductivity. Our invention gives high sensitivity, which leads to fast detection/imaging of high conductivity objects (such as metals) and makes it possible to detect low conductivity objects (such as biological tissue).

Development Phase/Current state

Laboratory proof-of-principle demonstration of the ability of the device and method to detect metals (copper, aluminum, titanium) and low-conductivity objects (salt-water).

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Technology Seeking: Funding/Investors Licensee Partner/Research Collaboration

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