ABSTRACT

The accuracy analysis of coil-based metal detectors with Arduino aims to evaluate the performance of these metal detectors in detecting and distinguishing different types of metals. This research involves factors such as coil design, sensitivity, noise, Arduino programming, test and validation, and usage environment.

The metal detector coil design is an important factor in detection accuracy. The size, number of turns, shape, and type of wire used in the coil need to be considered to produce a consistent magnetic field and be sensitive to field changes when metal is detected.

The metal detector's sensitivity to metals also affects the detection accuracy. Proper calibration should be done to ensure the desired sensitivity level and appropriate threshold settings.

Noise can affect detection accuracy. Dampening or filter techniques can be used to reduce noise coming from the surrounding environment or electronic circuits.

Arduino programming has an important role in accuracy analysis. The program should be able to take the data from the coil and analyze it accurately. Simple algorithms like thresholding or more complex algorithms like Fourier transform can be used.

Tests and validations were conducted using different types of metals with different sizes and compositions. These tests help evaluate the extent to which the metal detector is able to detect and differentiate between metal types.

The environment of use is also a factor that must be considered. Electromagnetic interference or other objects that emit magnetic fields can affect the performance of the metal detector.

By analyzing the above factors, this research provides insight into the accuracy of coil-based metal detectors with Arduino. The results can be used to improve the design and performance of this metal detector.

Keywords : *Metal Detector, Coils, Arduino, Accuracy, Design, Sensitivity, Noise, Programming, Test and Validation, Environment.*