

Application of Wheatstone and Maxwell's Bridges to Detect Security Fence Breakdown Positions

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Electric fences have long been used for herding animals such as horses around the world. In Sri Lanka, such electric fences can be seen widely used to prevent human-animal conflicts, especially with regard to elephants. Although these fences show a stronghold in restricting the animals, few of them are able to overcome the weaknesses associated with them. The main reason for such weakness is the use of insulating material such as wood logs when arranging the fences. Therefore, it is necessary to identify an alternative method to inform the people living near the fences when there is a breach in the fence. To address this issue, this study focuses on identifying the areas which can improve the work of the fence. For this purpose, a change in the impedance due to a breach of a fence post was considered. To detect such changes in the impedance, Wheatstone and its modified concepts known as Maxwell's bridge were used. As the animal activity breaches the fence post, it creates an unbalance in the bridge circuit which can be amplified as a signal to inform the people. To investigate the matter, this study set up a dummy fence and used it with breach and un-breach situations along with the impact of the distance between fence posts. Results show that even a small act on the physical breakdown of the fence is able to generate detectable impedance unbalance in the circuit. In addition, to obtain such results, the only modification needed to be done is the installation of a few circuitries in the energizer hut.

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