Inductive RFID Lab 1
Student Manual

Goal
Introduce students into inductive HF RFID. Allow students to experiment and experience first hand the advantages and limitations placed on RFID by electromagnetic principles.

Materials
Feig RFID Reader (FCC ID PJMMR101-PR101)
MetraTec Loop Antenna
Laptop Computer
13.56MHz RFID tag (TI Tag-IT: RI-I02-114A-01)
Ruler (Meter Stick)

Setup
Connect coaxial cable from the antenna to the Feig RFID Reader. Connect the Feig RFID Reader to computer via USB connector. Install Feig RFID Reader software1.

Procedures
Part 1. Read Range Measurement
Ensure the tag can be read by the Feig Reader and the ID is showing on screen. Then hold the ruler to the side of the antenna so that the antenna is at 0cm and oriented on the vertical plane. Hold the tag parallel and 40cm above the center of the antenna. Slowly lower the tag towards the antenna. Maintain its parallel orientation with the antenna. Continuing lowering the tag until the tag ID is read by the receiver. With your eyes on the same plane as the tag read the distance (cm) from the tag to antenna.

Part 2. Orientation Sensitivity
Hold the ruler to the side of the antenna so that the antenna is at 0cm and oriented on the vertical plane. Hold the tag at 45° and 40cm above the center of the antenna, measuring from the lowest edge of the tag. Slowly lower the tag towards the antenna. Maintain its 45° orientation with the respect to the antenna. Continuing lowering the tag until the tag ID is read by the receiver. With your eyes on the same plane as the tag read the distance (cm) from the tag’s lowest edge to the antenna.

Hold the tag at 90° and 40cm above the center of the antenna, measuring from the lowest edge of the tag. Slowly lower the tag towards the antenna. Maintain its 90° orientation with the respect to the antenna. Continuing lowering the tag until the tag ID is read by the receiver. With your eyes on the same plane as the tag read the distance (cm) from the tag’s lowest edge to the antenna.

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1 Refer to Inductive RFID Lab 1 Instructor Manual for installation of Feig RFID Reader Software.
Part 3. Performance Through a Dielectric

Ensure that the antenna is located on a portion of the desk where the tag has clearance to travel vertically under the desk. Hold the ruler to the side of the antenna so that the antenna is at 0cm and the ruler can measure below the antenna, under the desk on the vertical plane. Hold the tag parallel and 40cm below the center of the antenna. If 40cm spacing is not available use the maximum distance possible where the tag is unable to be read. Slowly raise the tag towards the antenna. Maintain its parallel orientation with the antenna. Continuing raising the tag until the tag ID is read by the receiver. With your eyes on the same plane as the tag read the distance (cm) from the tag to antenna.

Part 4. Conductors Effect on Magnetic Flux

Hold the ruler to the side of the antenna so that the antenna is at 0cm and oriented on the vertical plane. Place the tag flush against the metal slab. Hold the tag-metal slab parallel and 40cm above the center of the antenna. Slowly lower the tag-metal slab towards the antenna. Maintain its parallel orientation with the antenna. Continuing lowering the tag-metal slab until the tag ID is read by the receiver. With your eyes on the same plane as the tag read the distance (cm) from the tag to antenna.

Part 5. Antenna’s Magnetic Fields Test

Hold the ruler to the side of the antenna so that the edge of the antenna is at 0cm and oriented on the horizontal plane. Hold the tag parallel and 20cm to the side of the antenna’s edge. Slowly bring the tag towards the antenna. Maintain its parallel orientation with the antenna so that the antenna and tag are on the same plane. Continuing bringing the tag closer until the tag ID is read by the receiver. Read the distance (cm) from the tag’s edge to antenna’s edge.