

Localization Scheme for Passive RFID Tags Using 1D Stripline-shaped Antenna

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Radio Frequency Identification (RFID) technology is widely employed for tagging to real objects in our living environment including books in a library, merchandises in a supermarket, chemical bottles in a laboratory etc. To manage the data about the tagged physical objects, their positions can be key information. We propose a method to identify passive RFID tag location. The proposed method requires only a simple stripline-shaped antenna as a RF component. Other elements composing our localization system are one RFID reader and electric circuits which deal with at most several kilo hertz signals.

Motivation

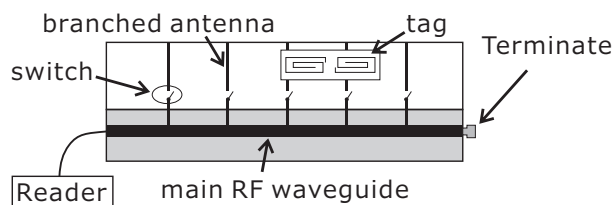


We use 1D structures in our living environment to store, manage, and arrange objects around us.

- > book shelf
- > lab storage (chemical bottles)
- > closet (clothes hangers)
- > supermarket (showcase)

➔ **Positioning, Ordering, and Sequencing objects along 1D lines**

System Overview

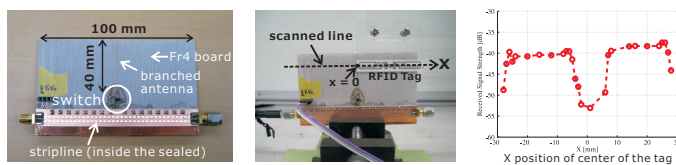


System Overview

- > small antennas branched off the main RF wave guide
- > switches controlling RF energy path
 - >> tags on active antenna: responsive
 - >> tags on non-active antenna: unresponsive

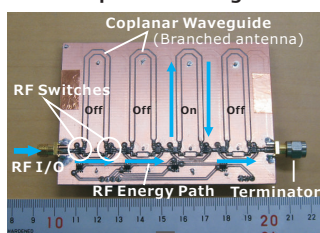
Feature

- > single RFID reader
- > small amount of RF radiatoin
- > DC~1kHz control circuits for antenna switching

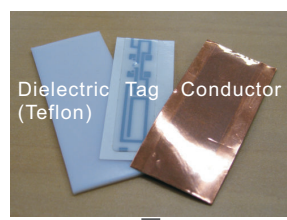


Prototype

RF coplanar waveguide



Selective Coupler for tag



Prototype System

- > RF energy path: coplanar waveguide
- > strong selectivity
 - >> Dielectric layer (PTFE, Teflon) on waveguide
 - >> coupler design for tag
- > Received signal strength does not vary
 - >> positioning resolution = antenna arrangement interval

Feature work

- > design and simulation of selective coupler
 - >> using received signal strength
 - >> high accuracy (~ 1 mm)
- > Application system

