

DESCRIPTION

ANGLE TAG

1. FIELD OF THE INVENTION

Radio Frequency Identification (RFID) is an advanced wireless technology that has been successful in many fields of application. A RFID system carries data in suitable transponders, generally known as tags, and receives and transmits data, by machine-readable means, at a suitable time and place to satisfy particular application needs to and from the interrogator, or commonly known as reader. The tag comprises an IC chip and an antenna, electrically connected to the IC chip, making it possible to store a wide variety of information on the tag and communicate wirelessly to an interrogator.

However, the application of passive RFID technology to securely tag articles such as office equipment, plant equipment and laptop computers, which have metallic surfaces or contain liquids in various forms, is relatively new and can be further exploited.

This invention proposes a RFID tag bent at approximately 90 degrees angle, with or without a hard housing, which can be attached onto a corner of the article. In particular, this invention provides the means to utilise RFID technology for articles with metallic surfaces or containing liquid.

2. BACKGROUND TO INVENTION

The Problem – Flat Label RFID Tag

Low cost tags manufactured by continuous feed processes are normally formed from tag stock, are two-dimensional, and are to be applied as flat label. Attaching a flat label RFID tag on an article only offers a single communication orientation in terms of coverage. If the direction of the antenna is substantially parallel to the direction of the electromagnetic field, for example, tag or reader might not pick up a readable signal. Also, if the RF signal is blocked, by stacking or other nearby articles, the readability will be affected.

A low cost and normal-sized tag is desired that can read and transmit in substantially any direction, allowing for orientation-independent operation, with increase in the readability of the tag. This will minimize the number of necessary readers or antennae and improve the reliability of detecting the tag communication signals.

Another Problem - Tagging of Articles with Metallic Surfaces

Conventionally, flat RFID label tags used in identifying articles with metallic surfaces offer only a very limited coverage and limited read range. This is because the UHF antenna impedance and frequency is drastically attenuated by the metal surface. This reduces the communication range between reader and tag, and the set-up is no longer be effective.

To overcome this, RFID tags for such articles need to have some thickness. This is impractical as the tag would then protrude out from one side of the article and become an obstruction. This is also aesthetically unappealing.

Another means is to place the tag on some non-conductive stand-off device, to interpose a constant and substantial air gap between the tag and the metallic surface, thus electrically isolating the tag from the article. The further the tag is away from the surface, the better is the read range. Various designs have been developed to allow tags to "stand off" from the article surface. However, standoff tags suffer from being easily dislodged or damaged in normal use.

Moreover, the tag is still being read from one orientation. If it is blocked by another article or any objects from the same orientation, the RF signal will be shielded and thus coverage will be compromised.

Yet another Problem - Tagging of Articles Containing Liquid

A similar issue of impaired readability exists with articles or products composed substantially of water or liquid. If the article contains liquid (including LCD panels such as in laptop computers), the attached flat label tag experiences weaker power to transmit the RF signal back to the reader as most of the UHF RF energy will be absorbed by the water or liquid surface that it tagged on.

Currently, there is no known single solution to the above problems.

3. SUMMARY OF THE INVENTION

By means of a unique housing design and assembly, this invention overcomes the above-identified problems by effectively creating a multiple-dimensional antenna for a RFID tag that provides good coverage, improved reading range, and is durable, secure and flexible in use.

The tag antenna configuration comprises an antenna folded into angle-shape inside the housing, offering in effect a first and a second dipole arranged in an angle manner, with the second dipole being positioned out of the plane of the surface of the article being tagged.

An angle -shaped antenna is optimal in terms of readability.

For flexibility in application, the actual degree of the inner bend depends on the shape of the corner of the article. The intent is for the angle tag to fit in seamlessly with the corner angle thereby giving multiple orientations for receiving and transmitting the RF signal from and to the reader via the reader antenna.

The multiple orientations offered by the bent tag antenna to the RF signals from the RF reader, increases the reading reliability of the tag. This achieves a comparatively longer operating range and less detection problems than when the tag is flatly adhered onto the article's surface on a single plane.

For the preferred embodiment, reference will be made to the appended sheets of drawings which will first be described briefly.

4. BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a 3-dimensional view of the invention.

Figure 2 shows the outer (top) view of the invention when ready to use

Figure 3 shows the inner (longitudinal) view of the invention when ready to use

Figure 4 shows the side (breadth) view of the invention

Figure 5 shows the exploded view and components of the invention

5. DESCRIPTION OF THE PREFERRED EMBODIMENT

Fabrication of the Invention

The tag can be any low-cost, passive, operating at UHF frequencies (e.g., 860 MHz - 960 MHz), and produced commercially on a large scale as flat stock labels.

The housing comprises of two separate parts, which can be fitted together as an angle.

The two parts of the housing can be formed in one piece each by injection-moulding or compression-moulding of a compound material such as non-electrically conductive plastic material or resin.

The tag can be affixed to the inner face of one part by ordinary adhesive. The two parts can then be assembled and sealed using adhesive or heat-bonding means so as to form the complete housing.

Industrial Applicability

It is anticipated that embodiments of the invention will be useful for deploying RFID to:

- Tagging articles of any sort
- In particular, articles with metallic surfaces, where the tag can be placed on the corner edge outside or inside the article.
- Articles containing liquid, including electronic devices with LCD screens such as laptop computers.
- Articles with corner of any degree.

The tag may be tested and/or programmed while mounted or affixed onto the article.

Features and advantages of the invention will be apparent from the above description of the invention and the preferred embodiment. The invention is not limited to the particular forms disclosed, and not all features of an actual implementation are described here. All modifications, equivalents, variations and alternatives should be covered within the spirit and scope of the invention as defined by the associated claims.

The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated and having the benefit of this disclosure.

CLAIMS

ANGLE TAG

We claim:

1. A radio frequency identification (RFID) system that comprises:
 - a. an angled shaped housing made of hard non-electrically conductive material,
 - b. a built-in RFID tag comprising of an IC chip which is accommodated inside the housing and an antenna which runs longitudinally along the sealed inner faces of said housing.
2. The said housing as described in claim 1;
 - a. is formed of two separate angle-bar-like parts, each part having two legs offset at an angle, forming an Angle, that is, an orthogonal (right angle) relationship or that which blends with the angle of the asset;
 - b. wherein each part is formed in one piece by injection-moulding or compression-moulding of a compound material such as non-electrically conductive plastic material or resin;
 - c. wherein each part fits onto each other and can be assembled and sealed using adhesive or heat-bonding means so as to form the housing;
 - d. can be firmly affixed to the article to be tagged, said attaching means comprises a layer of adhesive material applied to any outer face of the assembled housing.
3. Wherein the two legs of the said parts of the housing as described in claim 2 need not strictly be Angle or at right angles (90 degrees), but alternatively can be in an angle shape that blends with the angle of the asset to be tagged.
4. The said RFID tag as described in claim 1;
 - a. is affixed within the said housing such that the antenna is folded or bent approximately 90 degrees and is attached flush along both inner faces of the legs of the Angled housing;
 - b. wherein said attaching means comprises a layer of adhesive material applied to both inner faces of said legs;
 - c. wherein said antenna becomes effectively three-dimensional instead of as-usual lying on a flat two-dimensional plane;
 - d. wherein for maximum resonance, the width of the folded antenna is be approximately equal to the 2 sides of the tag housing which meets at the right angle;

e. wherein said antenna is capable to receiving and transmitting RF signals from/to a RFID reader in the vicinity from multiple orientations.

5. The said article as stated in claim 2d;

a. wherein the article may has metallic surfaces where the said housing is to be attached;

b. wherein the article may contain liquid;

c. wherein the article be made of other materials or contain materials that normally interferes with RF signals.

6. The system of claim 1,

a. wherein when sealed up, the entire assembly is impact resistant, durable and water resistant, rugged, and eminently suitable for use in harsh environments;

b. wherein for non-rugged application, the assembly need not be sealed up;

c. wherein for non-rugged application, the system can be used with the tag and just any one part of the said housing.

7. The system of claim 1, where the functions of the invention include, but are not limited to:

a. achieving improved RF readability by providing multiple read orientations of the tag with respect to the RFID reader, in terms of the RF signals to and from the tag;

b. maintaining RF readability when one orientation is being blocked or shielded;

c. instead of having at least two tags to achieve more than one orientation, one angle tag is sufficient to achieve the multiple orientations required for good and reliable read range and coverage.