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RFID Pet Monitoring & Identification System With RFID Tag Access Hatch.

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Abstract

(RFID) Radio Frequency Identification is a certain type of technology that uses communication via an electromagnetic field by magnetic waves to receive and transmit data from a terminal to and electromagnetic tag attached to an object of choice, for the importance of identifying and tracking objects. In this proposal it looks at the technology of Radio Frequency Identification and how it can be implemented into in world, the design of the RFID Pet Monitoring & identification system with RFID Tag Access Hatch is built with the idea of how this system can benefit pet owners and Vets, this system will allow pet owners to monitor their pets movement with alerts sent to their smart devices, it will inform the owner of when the pet enters and leaves the premises. When considering the benefits of the Vets research on what credentials the veterinary doctor requires on the pet is done, with this system the veterinary doctor will be able to pull up all the necessary information on the pet such as name, owner, previous appointments and medical issues.

Introduction

RFID stands for "Radio Frequency Identification" where a digital data encoded RFID tag, cards or labels are captured by a reader via radio frequency waves it is a technique that uses Electromagnetic fields to automatically process and identify credentials, track and monitor cards, tags or labels that are attached to certain object that you wish to gain information from, Energy waves are received by the tags and sent back to the reader which will give you the information you require for that object or animal, the RFID system has two main parts which are the tags and the reader, the tags holds an embedded transmitter and receiver, the components contained within the tags are two things, one being an integrated circuit for storing and processing information and secondly is holds an antenna which receives and transmits signal.

The tags can either be (Passive), (active) or (battery assisted passive),
- (Passive Tag); a passive tag is a tag that features no battery assistance and uses radio energy that's transmitted by the reader.
- (Active Tag); an active tag has an on-board battery and periodically transmits its credentials.

-(battery Assistive passive tag); this tag features an on-board battery but can be activated when a RFID reader is near.

An RFID reader features a two-way radio transmitted receiver which is called a transceiver and can also be called an Interrogator, what happens is the transceiver transmits and encoded radio signal to interrogate the tag, the radio signal activates the tag and the tags transponder converts the radio signal into usable power and that responds back to the reader. In Figure 1 it shows the type of RFID reader that can be used when designing a RFID system, when designing the system you have to consider the different types of RFID readers, it is important to choose the correct reader for the designed system, in this case the design proposal being that the reader will be attached to a door the system will have to be battery operated so that no wires are hindering the movement of the door.
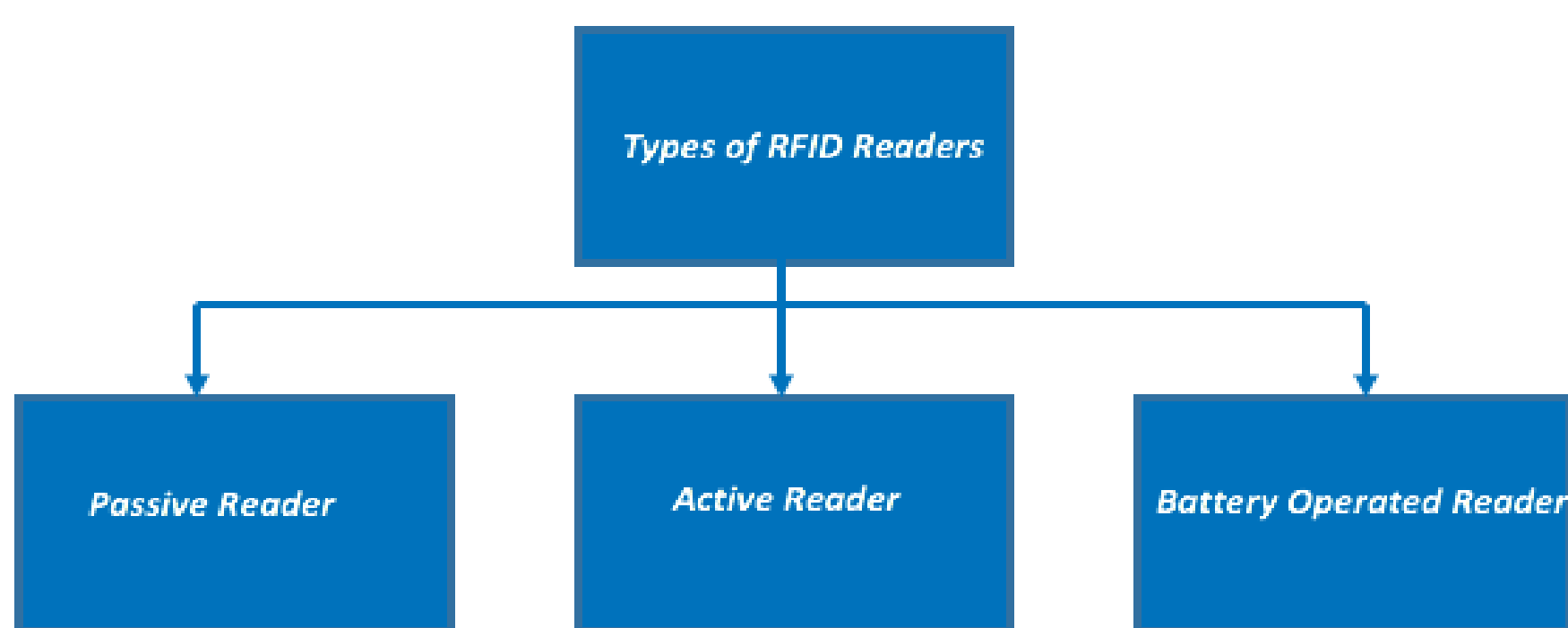

Figure 1 : Block Diagram of RFID Types

Aims and Objectives

The Aims:

The is to successfully design and build a system that uses the technology of RFID Tags, microchips and readers to allow the identification, monitoring and access to house hold pets. Focus on making it easier for pet owners and veterinary staff to keep tabs on the pet from seeing when the pet comes in and out to monitoring vet appointments with all the credentials of the pet the veterinary staff requires.
To successfully build a magnetic lock that works in conjunction with the RFID reader to allow or deny access depending on the chip that's within the proximity of the hatch.

Objectives:

•To propose and select possible design solutions to state and solve the problem
•to then focus how to go forth with design, development and construct with the aid of simulation and to vigorously test to ensure the workings of the project.
•To then carry out more extensive research on literature reviews of RFID technology in conjunction with magnetisation locks and programming techniques.

Methodology

The design solution has been comprised into two possible options, option 1 looks at the technology of the microchip and how it can be implemented into the system, it also shows a size comparison diagram in figure 2, it will inform you of where the chip will be placed on the pet, it also touches on the a second the second option which is a RFID tag that will be placed onto the collar of the pet, it shows a diagram, figure 3, of how the chip works with the transceiver with the RFID reader.

Option 1: **The design of a microchip imbedding** would make it easier for veterinarians to identify and get the information of the animal that's present and could have a system with all the necessary data from the diagnosis to the treatment records and general information that would be needed and quickly accessed just from the reader straight to the computer screen. The implanted chip is placed directly under the skin, once the animal goes to the vets the veterinarian would be able to just place the reader onto the collar and all the animal's information will be visible on the database. The owner will be able to know when the pet has left the premises or coming back in, it will show on their computer, smartphone or smart devise.

Figure 2 : Diagram RFID microchip (Privacyliving.com)

Figure 2 shows the size comparison of the microchip to a grain of rice, this system will not hinder the pet in any way, The components of the microchip implant contain three elements a chip, coil inductor and a capacitor the chip contains a unique identification data and electronics to encode the information, the implant location is dependent on the animal for dogs and cats the chips are normally implanted below the skin at the back of the neck between the shoulder blades. (**Journal, R., 2019**)

Option 2: RFID collar tag, This system would be able to read the animals tag which holds its identification, that tag is encoded and stored on the computer database. Inside the RFID reader an inductor is stored within it, it is commonly known to be in the form of a coil, when the inductor is connected with a capacitor and then driven by an alternating signal the amplitude that is across the voltage going across the inductor varies dependant on the frequency drive, the capacitor and the inductor, the RFID readers normally operate at the resonant frequency which is driven by the critical value of the voltage across the inductor reaches a maximum. When a tag or card is present and touched on the reader the data that is modulated on the card or tag will be sent to a reader then is fed to the microcontroller, this will be used as an identity verification card given to a person of the establishment, when the data from the card is matched with the data that is stored on the database of microcontroller, access will be granted. (**Journal, R., 2019**)
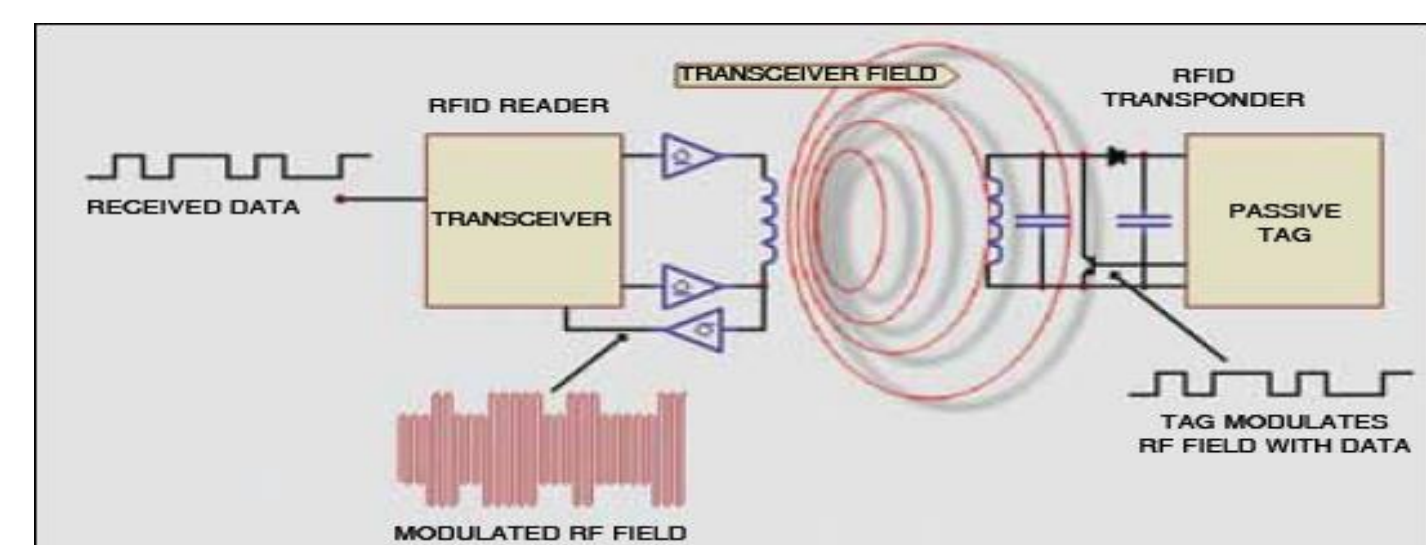

Figure 3 : Diagram of RFID Transceiver (Priority1design.com)

Figure 3 shows the passive tag that is around the pets collar working with the transceiver, firstly the transceiver will communicate with the passive tag, the passive tag hasn't got any power of its own and gains energy by electromagnetic field, this way causes the transponders resultant interaction of the radio frequency field to produce a voltage drop in the antenna, this is utilised by the tags to communicate the information stored. (**Priority1design, 2019**)

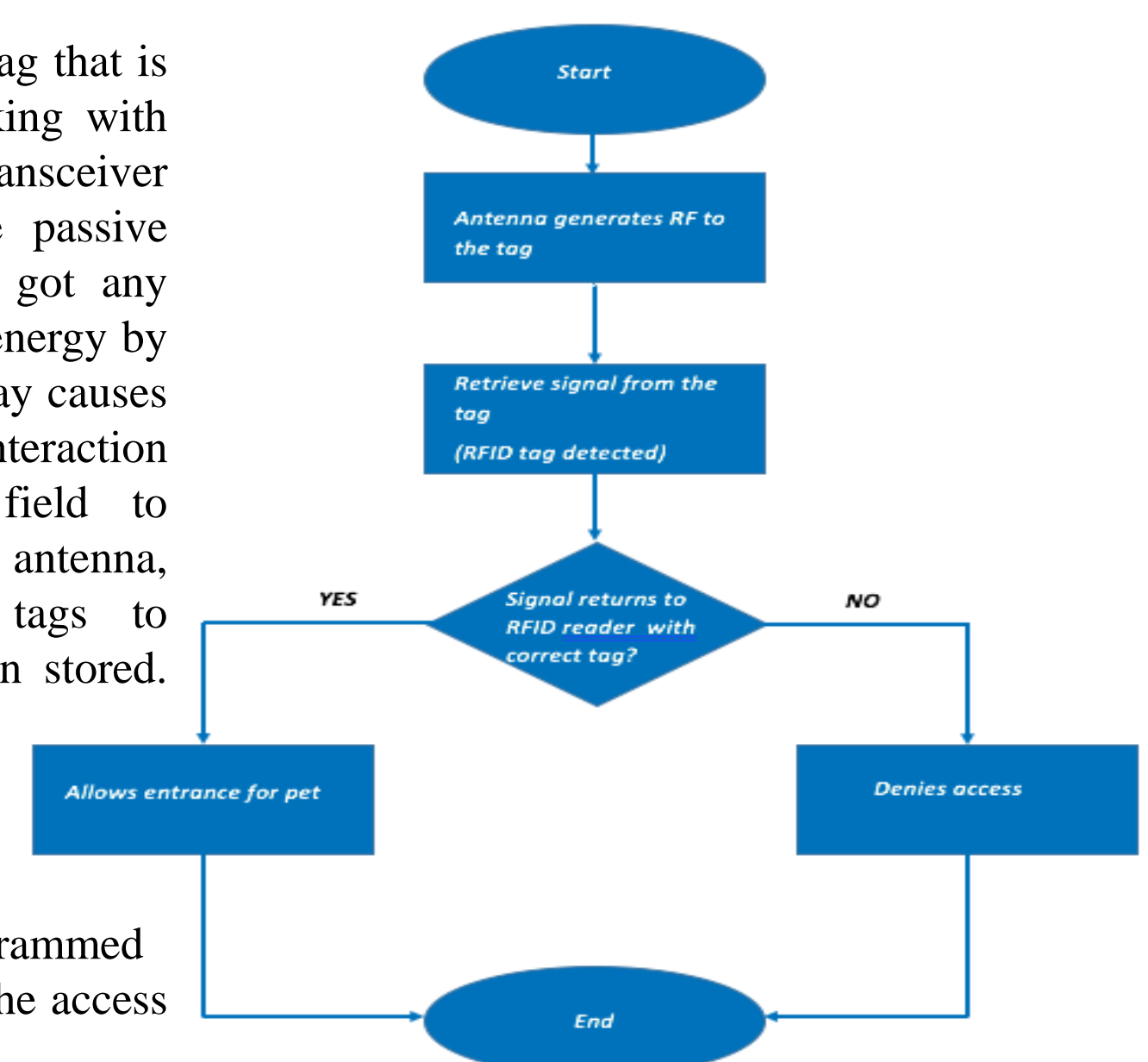Figure 4 demonstrates the methodology of how the system will process the programmed RFID tag to allow or deny the access or exit of the pet.

Figure 4 : flow diagram of RFID tag process.

Conclusions

To conclude this design project, this whole design is based for consumer needs and how to make it easier for the pet owner to track, identify and monitor their pet with the helping convenience of RFID technology, a system built so that also it does not allow just any pet to enter the household but only the pet with the encoded microchip or tag, a system that would allow veterinary staff to keep track of any appointments, past treatments and full credentials such as name, owner and address.

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