ISSN:0975-9646

RFID and GPS Combination Approach Implementation in Fisher Boat Tracking System

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Abstract - **Wireless sensor networks have potential to provide unprecedented remote monitoring. Capabilities that can benefit applications such as industrial control, environmental control, and defence. Radio Frequency Identification (RFID) is one of the most exciting technologies that revolutionize the working practice by increasing efficiencies, and improving profitability. It is also presented as a converting of today's barcodes, but the innovative technology has much largest possibilities such as individual serial numbers for each items, and the possibility to read these numbers at a distance of several meters. They are simpler to deploy than wired salutations and these networks will enabled improved understanding of processes and environments through continual monitoring of a larger set of parameters.**
In this project evolution of wireless sensor networks will be presented, using RFID Techniques with example of implementation in Fisher Boat Tracking System.

Keywords - ***Radio frequency identification, RFID, GPS, Global Positioning System, Fisher boat tracking system, RFID active tags, RFID passive tags, RFID readers.***

I. INTRODUCTION

Radio Frequency Identification (RFID) has existed in some form or another for 40 year. It is the tactic method of automatically identifying a given object/person by storing and remotely retrieving information from small transponders, referred as RFID tags. RFID middleware provides the interface for communication between the interrogator and existing company databases and information management systems. These tags have an associate antenna [1] created into them, that permit for the transmission and associated reception of radio to waves from an RFID transceiver (Fig. 1).

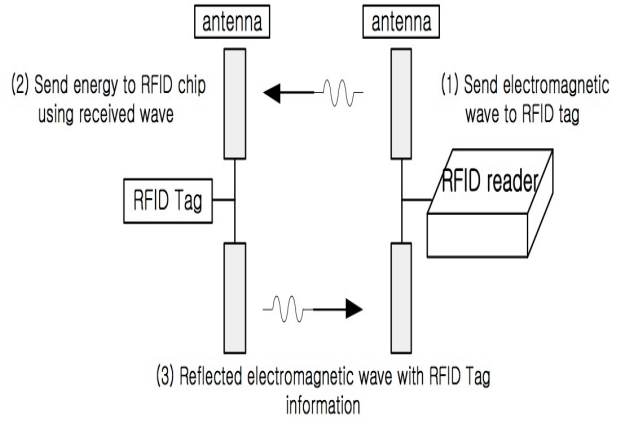

Fig. 1 RFID Diagram.

There are two kind of RFID tags available: active and passive. Passive tags required no power source, whereas Active tags need of power source to function. This paper presents the fisher boat activity tracking with Radio Frequency Identification (RFID) tag technology that helps in tracking the location. RFID tags are inexpensive, bar-code sized stickers that contain an antenna and a microchip that can be sensed wirelessly by an RFID reader [1].

The Radio Frequency Identification (RFID) system is a form of sensor network that used for identify physical objects. RFID is progressively used in many applications such as stock management, object trailing, retail checkout etc. The RFID system composed of readers and tags. All readers are use radio signals to communicate with tags, while tags may be passive (powered by the reader's signals) or active (battery powered) [2].

Readers communicate with tags using radio frequency signalling for obtaining the identifier and other data elements stored in the tags [2]. All readers are cantered in a finite area within which they can communicate with tags. This area is referred to as the reader's interrogation zone. Readers with overlapping interrogation zones will interfere with each other, usually to the purpose wherever neither reader will communicate with any tags located within their respective interrogation zones. Readers may additionally interfere with the operations of alternative readers, even if their interrogation zones don't overlap [5] [7] [8].

II. HISTORICAL BACKGROUND

The function of this technology was to identify weather an incoming plane was friend or for by using coded radar signals. These signals would trigger the aircrafts transponders, and a correct reply indicated a friendly military or civil aircrafts[2].

The 1st business RFID application was the "Electronic Article Surveillance" (EAS). It was developed in the seventies as a theft Prevention system. The probably first articular which is associated to RFID Technology was the landmark paper by Harry Stockman, "Communication by Means of Reflected Power" in October 1948. The 1st patent on RFID was issued in 1973 for a passive radio electronic device with memory.

Radio Frequency Identification presented one major obstacle before it could become a feasible or liable technology, finding an appropriate power supply. It took roughly thirty years for technology and analysis to generate internal power sources for RFID tags and chips [5] [7] [8].

III. RFID TAGS:

A- Passive RFID Tags: (Fig. 2)

- Passive RFID Tags don't have any internal power supply instead; a small electric power phenomenon is generated in the antenna when an incoming signal reaches it.
- This electric power phenomenon provides enough power to briefly activate the tag, sometime just simply long enough to relay simple information, such as an identity number or product name.
- As a result, passive RFID tags don't contain an influence power supply, they can be terribly small in size, sometimes thinner than a chunk of paper.
- These tags are often activated from a distance of 10 millimetres to over six meters away [4].

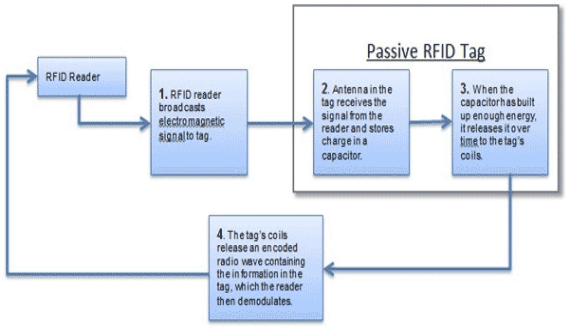

Fig. 2 Passive RFID

B – Active RFID Tags: (Fig. 3)

- Active RFID Tags holds an inner power source, which permits for an extended and longer read-range and for an even bigger memory on the tag itself.
- The electric power generators also generate it possible to save and store information sent by the transceiver.
- Active tags are bigger and greater than Passive tags, which is typically slightly larger than a coin.
- They will be browse and read from several meters away, and generally have an electric battery life of about 10 years [4].
- Most benefits of active tags include exactness, dependable, and superior performance in adverse environments, like damp or metallic.
- Being cheaper to manufacture, most RFID tags are of the passive variety. Analysts predict that ever-lowering prices and growing demand can eventually read in widespread usage of RFID technology on a worldwide scale [4].

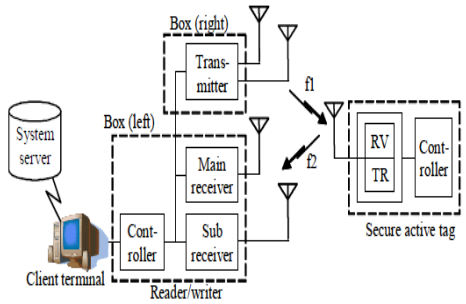

Fig. 3 Active RFID

IV. HOW TO USE RFID IN FISHER BOAT TRACKING SYSTEM/TECHNOLOGY?

4.1 Introduction of Fisher Boat Tracking Systems and Technologies:

Fisher boat tracking is different from GPS tracking system on land. GPS tracking system is working well at sea, because the reason is that there are no (urban) canyons, nor trees that break the weak signals from the satellites to GPS device. But unfortunately there are no cell- towers at sea.

So to communicate the output of a GPS receiver to a base station on land, it can't use telephone networks signals. Once a ship is 8 miles to 10 miles far away, any cellular phone not works.

However there are many different satellite communication services that can assure the communication between the ship and air base stations. For more see Commercial Satellite Communication Services on marine there are many ships and its tracking system is mandatory [6].

A- Tracking Technology use in Fisher Boat Tracking:

There are two types of tracking technologies use in fisher boat tracking.

1) Indoor RFID Tracking System

Passive RFID systems will be used for very little-ranges where the objects to be tracked pass through a small number of known narrow points that can be automatically watched – such as a containers or pallets of fishes goods passing through a door in a warehouse.

Passive RFID systems are only capable of saving and recording the movement of objects at those specific choke points and loose visibility and readability outside of those points.

Active RFID provides superior work where real-time or live tracking is required throughout a larger or maximum more complex area, such like as within a hospital, industrial or office building with many corridors, doors and rooms.

Active RFID systems with battery power have very large signal range and the active readers are actually cheaper than passive RFID readers, thus making deployment more cost effective overall.

An active RFID system is better where the objects to be tracked are large amount of value, mission critical, have a consequential impact if not fast located, or there is an additional security for privacy, regulatory or health and safety required for such information [4] [10].

2) Outdoor GPS Tracking System (Fig. 4 & 5)

GPS tracking system is use as outdoor tracking for fisher boat in sea, vehicles, assets and staff over a wide geographic area. Where an object requires to be tracked outdoors and also within buildings, then a joined RFID and GPS tagging system can be used as GPS alone does not provide indoor positioning.

RFID Centre will gives complete tracking systems with including GPS personnel, asset or vehicle mount units and a unique flexible web based application software system.

Tracking information is generate for availability of multiple end - users over world internet from a dedicated password protected web server. The system gives control, visibility,

authentication, privacy and live management of remote resources such as assets, vehicles and staff [10].

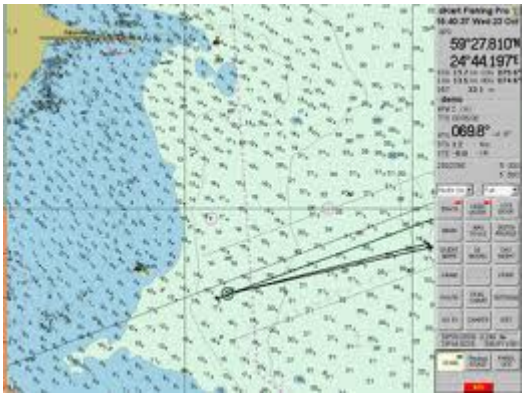

Fig. 4 GPS System when boat in sea

Fig. 5 How GPS Tracking System works

IV. CONCLUSION:

A dynamic well suited network devoted to both communication and localization of fisher boats is proposed. The solution is a combination of wireless ad-hoc network and the software defined radio. This solution also combines the advanced technologies as GPS technology, GIS one and it permits to extend communication range between fishing boats and the mainland. In addition, the proposed solution not only has a low implementation and recurring cost thanks to software defined radio, but also decreases interferences. However, this solution requires fishing boats in a group. More ever, in order to validate the performance of all system, routing and networking should be investigated.

The combine approach of GPS and RFID has been motivated by the fact that some advanced technologies as software defined radio, GPS and GIS technologies are well known with a suitable implementation cost and it may be an opened way for fishermen choices.

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