PART OF THE MASTERING RACE TIMING SERIES 2

A GUIDE to BUILDING YOUR OWN TIMING SYSTEM

atlasRFIDstore.com

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INTRODUCTION

New race directors and race timers frequently ask for our guidance putting together an RFID race timing system. Some have a do-it-yourself mentality and are eager to build their own chip timing system, but may not necessarily know where to begin.

After watching other companies set up timing systems at races, most interested professionals are familiar with the basics of race timing, but the inexperience of managing a system may create some headaches when you begin building your own system. This short guide will point you in the right direction and cut down on those headaches.

BASIC EQUIPMENT NEEDED FOR AN RFID TIMING SYSTEM

READERS - The reader will scan tags as they cross checkpoints and finish lines and is the brains of an RFID system. There are many types of RFID readers such as integrated, fixed, USB, and handheld.

ANTENNAS - The antenna in an RFID system serves as the crucial piece that communicates information between tags and the reader. Antennas can be categorized by their frequency, usage indoor or outdoor, mounting type, and polarization.

CHIPS/TAGS - A tag contains an RFID chip which stores and processes unique information. Race participants will wear one to two tags, either on their bib, ankle, or shoe, depending on the tagging method.

CABLES - Cables connect the antennas to the RFID reader. Connector type, length, and insulation rating are all very important considerations when determining which cables are right for your system.

SERVER - A server hosts your software and stores all of the RFID data coming in from your race timing system.

TIMING SOFTWARE - The software processes information and tracks time stamps of participants during races. If you are building your own solution, you will need to have knowledge of software development, or have a software developer build your ideal software solution. Reader manufacturers provide a software development kit, or SDK, that can be a good starting point when constructing your custom software.

RFID READERS

If you are a software engineer or have hired a programmer, you can choose from several popular RFID readers:

- Impinj Speedway Revolution R420 RFID Reader
- ThingMagic M6 RFID Reader
- Alien F800 RFID Reader

If you wish to avoid integrating with the reader, Impinj offers software that can read RFID tags and output data in various formats (e.g. keyboard wedge, http post, etc.). This software, Speedway Connect, only works with the Impinj Speedway Revolution R420 RFID Reader.

For close range RFID chip encoding, many race timers use an USB RFID reader, like the ThingMagic USB Plus. USB readers can connect directly to a PC and have short range antennas so that only the desired tag is encoded.

RFID ANTENNAS

There are several different types of antennas, so it is important to choose one that is rugged enough to withstand the demanding conditions of a race. Rugged antennas are generally rated IP 67, which indicates that they can be used outdoors in case of rain or high humidity. Examples include the RFMAX PL 9025 and the Laird PA9-12.

There are two different types of antennas used in race timing, panel antennas and mat antennas. Panel antennas are mounted on a tripod or truss at the finish line, while mat antennas lay on or near the finish line for runners to cross over. The type of antenna you choose depends on your specific race, especially the width of the finish line and the number of participants. Some timers use both types of antennas for their races to ensure reads are captured from multiple angles. To read more about how to choose the right RFID Antenna, read our second guide in the series, Selecting the Right RFID Race Timing Equipment.

RFID CABLES

Depending on your hardware configuration and the set-up of your system on race day, the RFID cables you need will vary in terms of length, insulation rating, and connector types.

It is important to ensure that cables are not an afterthought as using the wrong cables can lead to a high amount of loss in power, resulting in missed tag reads.

As a cable becomes longer, it will experience more loss. You can combat that loss by using a higher level of insulation for the cable. There are three main levels of insulation: 195, 240, and 400. The higher the insulation rating, the less energy will be lost; however the cables will also be thicker and less pliable, which could be a problem for some race timers. If you would like to better understand the relationship between cable loss and length, read this article to view the cable loss chart. **Note: the reader cannot be much more than approximately 50 feet away from the antennas, which limits the cable length.**

RFID TAGS

There are a few types of RFID race timing tags that provide excellent read range and are suitable for a variety of environments. Typical road races use an RFID wet inlay on the runner's bib or shoe depending on the equipment setup. A wet inlay is a paper-thin RFID tag with adhesive that can be attached to most plastic, paper, cardboard, and glass surfaces. Wet Inlays come in two formats: the standard, clear inlay with adhesive, or an inlay with a paper face, which is usually preferred for timers who want to print information on the face of the tag. Below are some of the most common wet inlays used in the timing industry.

- SMARTRAC ShortDipole
- SMARTRAC Dogbone
- Alien Squiggle

Races that incorporate water, such as triathalons or bicycle races, usually cannot use a wet inlay since they are do not perform well around water. Race timers that time these events use a hard or rugged tag that can survive harsh conditions and a changing environment. Below are two examples of tags that are currently used in triathlon races.

- Triathlon Tag
- HuTag XC1

To learn more about how to choose a tag read the third ebook in the Mastering Race Timing Series, Choosing the Right RFID Tag. For more information on tag placement on racers, read the fourth ebook in the series, How to Properly Tag Racers.

ABOUT US

Founded in 2008, atlasRFIDstore is a trusted source in the RFID hardware industry. We are a global retailer providing customers a secure, one-stop location where you can buy RFID components for your own systems and applications.

atlasRFIDstore sells name-brand products in virtually every RFID hardware category, so customers can build cost-effective RFID solutions across a variety of verticals.

The atlasRFIDstore team focuses on creating the absolute best customer service experience and works with our customers to select the right RFID equipment for specific applications.

Our sales engineers are highly trained in the field of RFID and are ready to answer your questions, big and small. While we may not immediately have an answer, we'll diligently work for you to find a solution.

Our offices are located in the Innovation Depot, a technology hub in downtown Birmingham, Alabama. We have customers all around the globe and ship products worldwide.

INDEX OF PRODUCTS REFERENCED

READERS

ANTENNAS

TAGS

MISCELLANEOUS PRODUCTS

MASTERING RACE TIMING SERIES

A GUIDE TO BUILDING YOUR OWN DIY RACE TIMING SOLUTION - A complete Do-It-Yourself guide to building your RFID race timing system.

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