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RFID: A revolution in inventory control systems

by Vince Long

By the title of this article you may have thought that it had landed in this publication by mistake, but be assured, Radio Frequency Identification (RFID) has many educational applications and you are likely to encounter it there within the next few years.

Ever since we humans have been collecting and organizing people and things, we have been devising systems to keep track of them. Ledgers kept on paper sufficed for centuries until the advent of computer systems and their evolution from punch cards to hard drives. Regardless of the system, collecting and entering the data has always been the most labor-intensive part of the operation. Legions of workers toiled away for years at keypunching operations prior to the development of the ubiquitous bar code.

The bar code, properly called the Universal Product Code (UPC), was patented in 1973 and was developed primarily to automate the check out system in grocery stores. Its application has spread to virtually every product available at the retail level and is also used in inventory control by wholesalers and manufacturers. The UPC contains 12 digits that encode information about the manufacturer and the product's unique identifier. The code is read by pointing it at a laser beam that reflects the image back to a computer system which decodes the image and matches it up with the product name, price, etc. While it was a major advancement in retail point-of-sale transactions, it still required a human to locate the bar code on the product and place it under the beam of the laser.

The next generation of product identification is the RFID.

Rather than a printed label that appears on the product or its packaging, RFID consists of a radio transponder in the form of a microchip that can be embedded in the product's packaging or within the product itself. While it is now just entering the retail world, RFID has been used in other applications for several years. Here are some current uses:

- About the size of a grain of rice, the chip can be implanted into a pet. If the pet becomes lost, a veterinarian or animal control officer can "scan" the chip to determine the animal's identity and its owner.

- The chip is used extensively in sporting events as a way to measure an athlete's time in races. In a marathon where thousands of runners await the starting pistol, those in the back of the pack may wait

for 10 to 15 minutes before they even reach the starting line. To solve this problem, each runner wears a chip, usually tied to a shoe, which activates a timer, unique to him or her, when they actually cross the start line. At the end of the race, the timer is stopped when they cross the finish line. The same technology is used in track, swimming, and



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by Kevin Croff

As I sit here thinking about what to put in the president's column, I am coming up with more questions than comments. Does technology really make a difference in student learning? What are some applications that are being used successfully in classrooms? Where do you find money to supply teachers and students with the resources they deserve? How much staff development is needed and should we hold teachers accountable for being proficient in some basic technology skills?

I have a lot more questions and far less answers. One way to help come up with these answers is to develop some collaboration and communication among the finest educators in Montana, and we just happen to have such a pool of people at our disposal through MCCE. Shortly after you receive this newsletter, I'll be posting some of these questions on the listserv to generate discussion. Another excellent opportunity to ask some of your questions or possibly hear some of the answers will be at the MCCE Panel Discussion at MEA in Helena. The panel will be composed of teachers, administrators, OPI employees and members of our legislature addressing critical issues on technology in education. We encourage you to show up at the session on Thursday the 21st from 11-12pm in the Helena Middle School band room. Additionally, don't forget to attend the general meeting for MCCE on Friday the 22nd at noon in the hospitality room. We'll buy you lunch and you'll have an excellent opportunity to win some of the great prizes that are drawn for at the end of the meeting.

Thanks for all that you do for the students in Montana and if there is anything you would like to see from MCCE, please let me know.

croffk@billings.k12.mt.us

MCCE NEWS

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RFID

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bicycling events as well.

- Some anti-shoplifting systems are RFID-based. A chip is embedded in the product or its packaging. Unless the chip is deactivated, it will set off an alarm when the chip moves past the antennas at the store's exit.

- Toll booth payment systems on roadways read chip information from passing vehicles and deduct tolls from a prepaid account.

- Baggage on airline systems are affixed with a chip that tracks its location, virtually eliminating the problem of lost luggage.

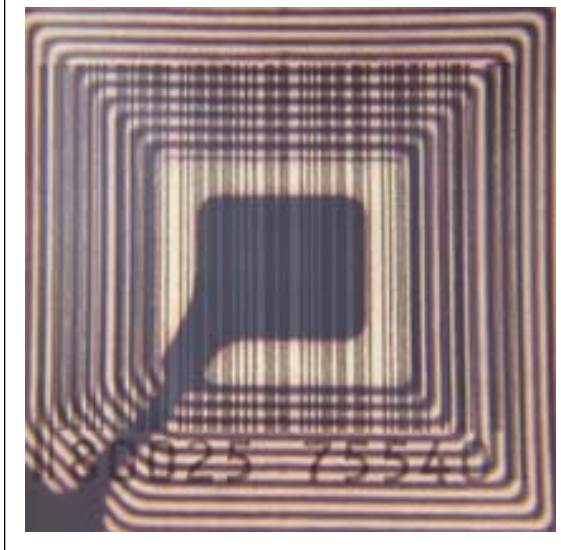
RFID chips, actually called transponders, come in two types: passive and active. The passive chips, less than one-half a millimeter square and as thin as a piece of paper, are powered by the transmitter's antenna and generally can only reply with their serial number and must be within about 15-feet of the transmitter. The active chip, about the size of a small coin, carries its own battery, which may last for several years. It can respond with more information, and has a range of up to 30-feet. Within those families of RFID, there are four frequency ranges: low, high, ultra-high (UHF), and microwave, each with advantages for specific applications.

The biggest change that the consumer will notice with the mass implementation of RFID, will be in retail point-of-sale. It will no longer be necessary for each product to be scanned by a laser. A shopping cart full of RFID chipped items can be scanned without removing them from the cart. It is conceivable that the customers could bag their groceries as they move through the store, pull up their carts to an unmanned checkout, have the cart scanned in an instant, swipe their credit or debit card through the payment system, and be on their way. If the credit card is embedded with an RFID chip, the card swipe is even eliminated. The obvious advantage to the retailer is that

check out lines will be eliminated along with the need for checkers and the "box boy." They also expect to eliminate shoplifting by both customers and employees. Wal-Mart made the news recently when it announced that all of its major vendors would be required to switch their product identification to RFID by January 2005. While not covered as widely, the Department of Defense has issued the same requirement to military contractors to implement the change by 2005.

There is no doubt that the change is coming, but will we see it implemented in our schools in some way? This is likely and there are already some pilot projects underway. School purchasing departments will adopt the technology just as they did the UPC to handle inventory control on everything from dry-erase markers to reams of paper. School libraries, many of which have just recently begun to

use electronic circulation systems based on bar codes, will see some advantages to RFID systems. Not only can an entire stack of books be scanned at one time, but it is also possible to determine the physical location of any book in the library. When a book is placed on the wrong shelf in the library, it is essentially lost and librarians must constantly "shelf read" their collections, looking for books which show up as checked-in, but are not in their correct location. Parnly Billings Library, the public library in Billings, Montana has recently adopted RFID in its facility.



At least one school, a charter school in Buffalo, New York, is testing RFID as a way to automate the student attendance system. Students wear ID cards which show their picture, name, and contain an embedded RFID chip. Attendance is taken automatically by transmitters installed in the classrooms. Not only can this system be used for attendance, but can also locate a student in the building at any time. The system costs about \$25,000 and the ID cards cost about \$3.00 each.

As with any new technology, there are impacts that need to be examined prior to its rollout. Privacy issues loom as the

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RFID

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largest concern with RFID implementation. Do we want our products to be transmitting data to receivers once they leave the store? Proponents offer up what they see as some advantages, for example, an RFID equipped refrigerator could notify the owner when certain products have gone beyond their expiration dates. However, using a high-gain antenna makes it theoretically possible to scan the contents of a house without ever crossing the property line, bringing up the scenario of burglars shopping a neighborhood for the perfect target. Portable RFID readers already exist that can be worn as a wristwatch allowing for casual scanning of nearby chips.

While the retailer, as the chip leaves the store, can disable the active type chip, passive chips continue to respond to queries, essentially forever. These concerns have led to various legislative bodies looking at regulating the use of RFID. In response, the RFID industry has established non-binding suggestions that encourage users of RFID to notify consumers that the tags exist and how to remove or disable them.

As we look over the technological landscape that is spawning a plethora of wireless communication devices, cameras, and now RFID, it appears that George Orwell's prediction about Big Brother, in his novel, "1984," is becoming a reality sooner rather than later.

Web sites with more information about RFID

Enterprise Charter School

A charter school that is implementing RFID for various applications including student attendance:
<http://enterprisecharter.org>

How RFID works

Detailed yet simple description of RFID and related technologies.
<http://www.howstuffworks.com/upc.htm>

The RFID Journal

The RFID industry news and information.
<http://www.rfidjournal.com/>

Spychips

A look at the privacy issues surrounding RFID.
<http://www.spychips.com/>

Shock sites not amusing to all

There is a trend on the World Wide Web to shock visitor to web sites by showing objectional content without warning. There are many of these sites out there that masquerade and a normal link but when opened confront the visitor with photographs or animations with strong graphical content.

The user does not always know that they are headed for one of these sites and can end up there by clicking on an innocent link in a search engine. Links also appear in various online bulletin board or discussion areas.

For more information:

Shock site article on Wikimedia:
http://en.wikipedia.org/wiki/Shock_site

Newsweek article about sites with questionable content:
<http://msnbc.msn.com/id/6073228/site/newsweek/>

Turning off Windows messenger service

It's a nice idea really. Using the "net send" command, a network administrator can send a message to individual computers a a network. The user could be warned that the system is about to reboot or that there is fresh coffee in the break room.

However, the "bad guys" have also figured out how to exploit this feature and pop messages up on users' screen that can be inappropriate or entice the user to do something they shouldn't on the network. Even enterprising students at some school have figured out that they can disrupt an entire computer lab by sending messages this way.

To disable Windows messenger service it is necessary to click through a few setting on the computer. Rather than replicate the process here, take a look at the following web sites for more information:

<http://www.itc.virginia.edu/desktop/docs/messagepopup/>

<http://www.rdpslides.com/pptfaq/FAQ00471.htm>

http://www.jjscomputing.com/Help%20Pages/how_to_turn_off_windows_messenge.htm



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