Inventory tracking using UHF-RFID technology

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Background

Warehouses and stores need to keep track of their inventory, but manual labor is prone to human error and is time-consuming. This project aims to provide an efficient solution for inventory tracking. The idea is that the tags would provide a tally as well as store additional data such as expiration date, so that this information can be collected in a single scan.

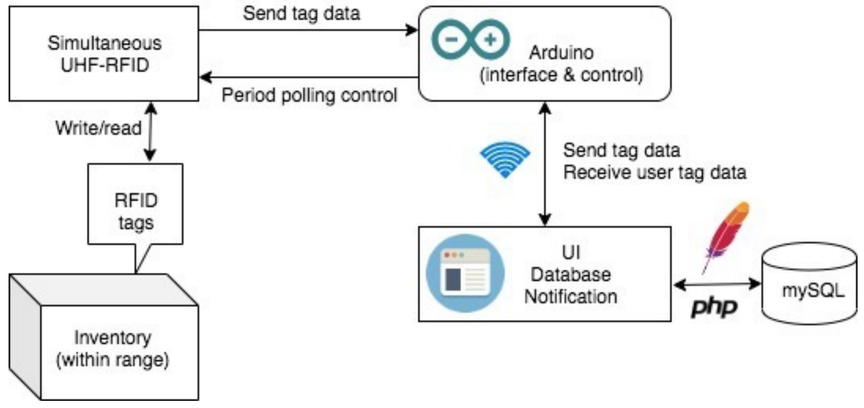
Goal

We aim to build a device that does not rely on bluetooth but uses UHF-RFID technology, which allows the tags to be as small as the size of a sticker. The small size of passive RFID stickers allows users to track store items of any size. The RFID tags are passive and do not require any battery. We will store an item's information on the tag so that scanning them provides some useful information beside a simple tally. There will also be an application interface that displays the collected information.

References
Hahnel, Dirk, et al. "Mapping and localization with RFID technology." IEEE International Conference on Robotics and Automation, 2004. Proceedings. ICRA'04. 2004. Vol. 1. IEEE, 2004.
Seidle, Nathan. "Simultaneous RFID Tag Reader Hookup Guide." Sparkfun Electronics. Accessed Nov 1st, https://learn.sparkfun.com/tutorials/simultaneous-rfid-tag-reader-hookup-guide
Xiao, Gaozhi, et al. "Printed UHF RFID reader antennas for potential retail applications." IEEE Journal of Radio Frequency Identification 2.1 (2018): 31-37.

Materials

Sparkfun Simultaneous RFID Reader
Arduino Board
RFID tags



How it works

The RFID reader provides an electromagnetic current that activates the passive RFID tags placed on personal items. The tags then emit a signal that is detected by the reader. The reader send this information to a mobile app that logs an item's location relative to the phone using the phone's gps software.

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Milestone

— Connect the RFID reader hardware to Arduino for single and multiple tag read
— Configure Arduino for Wifi communication with server (pull & post tag data)
— Write a web app that displays information collected from the tag scan, stores user input to database

Progress

Configured RFID and Arduino for single tag read
Communicated with server to begin tag scanning and upload tag data
Set up website front & back ends with database and UI

Future Work

Configure tags to store input information from UI
Multiple tags, extend antenna range
Refine UI, set up server to detect tag data POST request from RFID reader
— Possible challenges:
Writing data to multiple tags (64 free bytes ea.)
Set up server so that hardware can pull user data to be encoded to tags

Team Organization

Web front & backends: Tim Nguyen
Arduino & RFID: Serena Do