

Livestock Tracking System

Where's Bessie?



SARE Disclaimers

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The Problem

Remote Pastures

- Humans Can't Count
- Where's the !@#\$ animal?!
- Who went through there?
 - Hours in a day

Potential Solutions

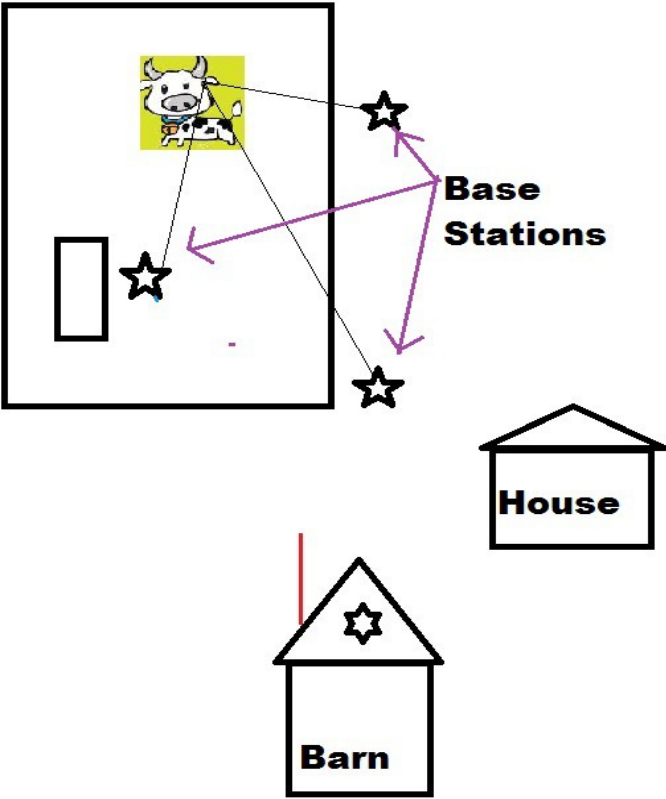
- SARE funding
- I know computers
- I know the Internet
- Moore's Law is working for us (finally)!

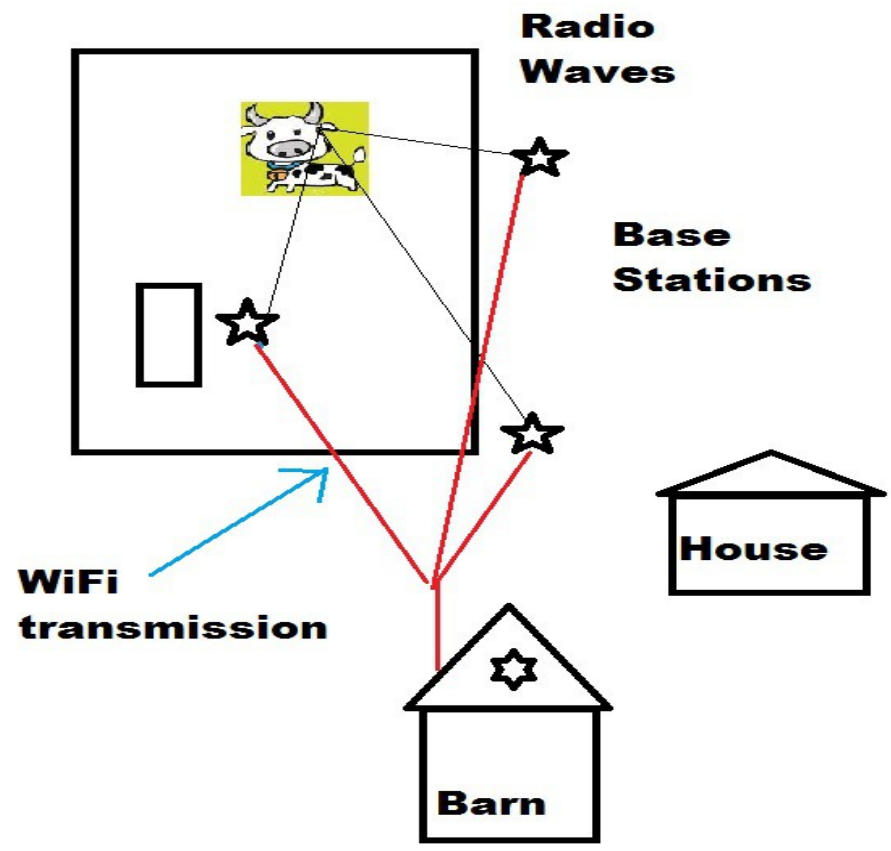
Concept

- Use speed-of-radio to measure distance to animal.
- Requires at least three “base stations”
- Use 2-way Radio Modems (Xbee/Zigbee)
- Get Internet to our Fields
- Real-time updates

Implementation

- Minimum of 3 base stations (BeagleBone Black/TI Sitara)
- Each animal has a “ear tag” with a radio modem (~\$25 for 1mi range) and battery
- Base stations will send signal to each ear tag and measure time for signal to return.
- Base stations will perform minimal processing and send data over internet to server.
- Farmer looks a website showing where animals at any given moment.





Bumps in the road

- I/O system changed on latest Beaglebone Black revision. This cost about 1 year in figuring things out.
- WiFi was not the best choice for data transfer. Ended up using a modified WiFi (Wide Area Broadband) after trying several other technologies.
- 2 Years max time allowed for SARE grant.
- Digital Radio is everything but simple.
- More complicated for farmer to configure than anticipated.

Basic Usage

- Set up networking
- Set up base stations
- Set up Ear tags
- Move base stations and animals to field
- Erect base stations where animals can't get to them!
- Insert batteries in ear tags

Basic Usage

- Go home
- Discover one base station isn't sending data.
- Go back to field and curse at trees.
- Curse more when the 2nd best place has bad terrain
- Move base station so its not blocked by trees.
- Go back home





Basic Usage

- Discover all base stations are now sending data.
- Discover that there's not yet a web interface.
- Use raw data to determine distance in terms of vectors and magnitudes.
- Discover that all the batteries in the ear tags are dying.

Things Left To Do

- Web Interface (Read Only)
- Better “ear tag” batteries/power. Solar?
- Be able to operate “off-line”
- Use Real Time Kinetics on the base stations.
(Precision Ag)
- Make it “Auto-configure” (Farmer just supplies the ear tag numbers)

Testing

- It does work in winter weather (but don't know for how long)
- Will probably need desiccant in base stations
- Cattle are Real Hard on ear tags
- Concerned about radio traffic congestion interfering with distance calculations

Farmer Feedback

- This is not a “product” yet
- I got tired of people telling me it couldn't be done.
- You can download all the software and the “plans” (my README file) change things, and make it better for the world.
- Looking for partners to make it production ready and to market.

Plug for FarmHack.org

- FarmHack.org has a number of projects to help farmers with farming.
- FarmHack.org is entirely open source, along with all of its projects.

Always Evolving...

- This project was to solve a problem and hopefully help others.
- It will be always evolving... And could dramatically change from time to time – including stop working!

Down The Pike

- Invisible fences for grazing animals
- Auto-moving fences for grazing animals
- Monitor health/hydration/... for each individual grazing animal.
- “Internet in a Field” gives abilities:
 - Monitor forage, water health
 - Monitor weather
 - Real-time video
 - Fencing monitor, control

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