ELECTRONIC ID for INVENTORY

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TIME-FRAME

PHASE 1: Conduct census in each room, listing cages and locations.

PHASE 2: Comprehensive software to address the list of cages, and identify and handle discrepancies.

<table>
<thead>
<tr>
<th>Planning</th>
<th>Hardware Development</th>
<th>Software Development</th>
<th>Operation &amp; Maintenance</th>
</tr>
</thead>
</table>

SOLUTION

RFID Reader, Custom Software: Interface with Current Database

Reader: Motorola MC3190-Z
RFID Tag: Alien Squiggle Higgs 3

- Ultra-high frequency
- 10 ft. read range
- Circularly polarized
- Supports 802.11a/b/g
- Memory: 256MB RAM
- 1GB Flash

Software: Microsoft Windows Mobile 6.5 Classic Edition
.NET Compact Framework 3.5

Development Software:
- Visual Studio 2008
- Motorola EMDK v2.5
- Windows Mobile 6 SDK
- Windows Mobile 6.5 Dev Tool Kit
- C# Programming Language:
  - Compatible with EMDK
  - .NET Framework to quickly create user interface
  - Ease of programming
  - Robust debugging tools available

Designated Budget:
- Initial Start-up: $20,000
- Proof of Concept: $5,000 (included in above)

BUDGET

- 10 Years taken as serviceable Life-Cycle (no plans to retire the selected system until necessary).
- Effective annual interest rate taken as 3%.

EID SOLUTION:
- $20k initial investment.
- Maintenance is minimal.
- LAR staff or paid for as needed.
- Disposable RFID tags.
- RFID tag replacement cost of $10.5k/year.

COMMERCIAL ALTERNATIVE:
- $150k initial investment.
- $8k annual maintenance cost.
- Re-usable RFID tags (2 year serviceable life).
- RFID tag replacement cost of $40k/2 years.

SAVINGS:
- EID Solution is more scalable than needs of LAR.
- LAR retains choice of vendor & can control costs by changing order quantities, negotiating with or changing vendors.

SOFTWARE FILTERING

Establish two separate filtering thresholds:
- Plastic: -57 dBm
- Metal: -57 dBm

Higher threshold for plastic profile.

NEEDS

Key needs in this project include:
- Function within the constraints placed on LAR as an operating animal laboratory.
- Provide capability to track cage locations, etc.
- Facilitate census confirmation on a weekly basis,
- Solution should be amenable to modular or incremental implementation.
- Reader must read all tags in the room being scanned
- Reader must not record tags in a neighboring room won’t be recorded
- Reader must be able to read tags placed on metal or plastic
- Reader must be able to record tags in a different location through a wall
- Reader must be able to record tags in a different location through a wall
- Reader must be able to identify and handle discrepancies.

ENVIRONMENT

Three facilities – 20,000 interior sq. ft. total.
House 3500 cages in a variety of rooms.
Rooms vary from 3’ x 8’ to 16’ x 25’.
Cages may be plastic or metal.
Cage card holders may be plastic, or metal (see inset).

LESSONS LEARNED

Our team learned about RFID technology, and implementations.
Additionally we learned:
- Fully explore needs of customer early (may be dynamic),
- Flesh out requirements from the beginning,
- Time Management: When working for a customer plan ahead and make time to work with their schedule,
- Revisit requirements and progress on regular basis.

Software experience taught us:
- Windows mobile devices use compact framework, which provides significantly less functionality
- Latest software updates might be broken (e.g. many hours spent searching for code errors – just needed to roll back to a prior version of EMDK)
- Methods to efficiently update a user interface.

ACKNOWLEDGEMENTS

Our team would like to thank the following:
- Dr. Lon Kendall
Lab Animal Resources at Colorado State University.
- Dr. Ali Pezeshki
Olivera Notaros

ABSTRACT POINTS

This project presents Lab Animal Resources (LAR) at CSU a remote sensing solution for managing the status of live animals in laboratory setting.
LAR faces a challenge in periodically reviewing the count and location of occupied cages, as well as tracking the care and location history for each cage, and maintaining all the collected information in a database format.
LAR desires a remote sensing solution in order to reduce the labor and cost required for operations as well as reducing the risk of human transcription errors.

TESTING

Performance of Higgs3 on Metal at 17 dbm
Filter Threshold

Several round of testing narrow down the choice of RFID tag.
Software provides redundant assurance that tags in neighboring rooms won’t be recorded.
- Filtering
- User confirmation

PHASE 1:
- Conduct census in each room, listing cages and locations.

PHASE 2:
- Comprehensive software to address the list of cages, and identify and handle discrepancies.

SERVICE 1:
- Motorola MC3190-Z
- Alien Squiggle Higgs 3

SOFTWARE:
- Microsoft Windows Mobile 6.5 Classic Edition
- .NET Compact Framework 3.5

3500 cages in 16’ x 25’ rooms.

LABORATORY SETTING

This project presents Lab Animal Resources (LAR) at CSU a remote sensing solution for managing the status of live animals in laboratory setting.
LAR faces a challenge in periodically reviewing the count and location of occupied cages, as well as tracking the care and location history for each cage, and maintaining all the collected information in a database format.
LAR desires a remote sensing solution in order to reduce the labor and cost required for operations as well as reducing the risk of human transcription errors.

How quickly can you count 3500 cages?

Are you sure you didn't miss any?

Initial Start-up: $20,000
- Proof of Concept: $5,000 (included in above)

Threshold: 64-bit unique tag ID

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