Top Dog Technologies
Territory Tracking and Restriction System

Christopher “Jester” Wesp
Denise “Merlin” Cuppett
John “Viper” Kaczmarek
Michael “Ice Man” Stewart
Contents

- Problem and Requirements
- Design Alternatives
- System Description
- Design Outline
- Project Scheduling
- Testplan and Demonstration
- Team Management
- Project Concerns
Problem Background

- Track and control pet whereabouts when humans are absent
- Protecting indoor furniture and belongings
Needs Statement

There is a need to have a pet deterrent system that tracks pet movement throughout the house 24/7 by monitoring and documenting when a pet enters off-limit areas and deters the pet when needed.
Goal

Create a network of receivers and transmitters that can record the general location of a pet and deter it from the off-limit areas.
Requirements

- The system must cost less than $500 to be competitively priced based on the quality level it provides to the consumer.
- The system must use a power source accessible to the public, such as a battery, and the power source must last at least 1 month without being replaced.
- The system must not harm animals or people.
- The system must function well in a typical indoor environment.
Requirements

- The collars should be light, less than 1 pound, and comfortable for the pet.
- The system must be easy for the user to set up which is defined as the set up time taking less than 30 minutes.
- The system must be easy to use and adjust, any adult with basic computer knowledge should be efficient with the system after 1 week.
Requirements

- The system should have a variable range that covers an area with a 3 foot radius to an area with a 20 foot radius.
- The system should document the zone and time when a pet violates a restricted location.
- The recorded information should be displayed to the user in an organized and understandable fashion.
Design Alternatives

- Transmitter and Receiver Chips
  - TRF7960 from TI
  - ADF7020 from Analog Devices
  - CC1100 from TI
  - TXM-315-LR from Linx

- Deterrent Settings
  - Programmable
  - Hardware Switches
System Level Description

Diagram:
- Zone #3
- Deter
- Pet Trackers
- Zone #1
- Record
- Zone #2
- PC
System Level Description

Pet Tracking Process

1. Step 1
2. Step 2
3. Step 3
4. Step 4

Transmitter → Receiver
User → PC
Transmitter Design

Territory Tracking and Restriction System

Unit 12

Area Radius

1 ft

20 ft

Deterrent Settings

1 2 3 4

Deter
Track
Transmitter Design

Signal Transmitted

Example Signal Transmitted
Receiver Design
System Design

Outside of Zone
- Sleep
- Search
- USB Mode

In Zone
- Enters Zone
- Deter
  - Yes
    - Stays in Zone
    - Deter & Store
  - No
    - Store Only
    - Stays in Zone

Still in Zone
- Continue to Deter
- Do Nothing

Return to Original State
Software Design
# Project Scheduling

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Tasks</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Transmitter and Receiver Pair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Software with Basic Functionality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Storage System and Software Compatibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build Transmitter Disk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build Collar Receiver and Deterrent Signal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Build Storage System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perfect Transmitter Disk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perfect Collar Receiver and Deterrent Signal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perfect Collar Storage System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Project Scheduling

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Tasks</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Add Functionality to Software</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Focus on Parts of the Project that Failed Testing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test and Correct all Aspects of the Project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Develop Final Report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Develop Final Presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Design Validation Plan

- Range Test
- Deterrent Test
- Power Test
- Software Accuracy Test
- Accuracy Stress Test
- Software Suite Test
Design Demonstration

- Have transmitter and receiver active
- Bring receiver into range at various times with different transmitter settings
- Connect receiver to software suite and demonstrate the accuracy of the information
Team Management

- **Michael**
  - Team Leader, Head of Finances and Purchases
  - Working on receiver hardware

- **Chris**
  - Head of Software Design, Head of Technical Reports
  - Working on software suite

- **John**
  - Head of Systems Design, Head of Documentation
  - Working on PIC programming

- **Denise**
  - Head of Hardware Design, Head of Project Validation
  - Working on transmitter hardware
Health and Safety Concerns

- Verify that the transmitted signal conforms to FCC regulations
- Design the collar and deterrent method to not harm or hinder the pet
Social, Political and Ethical Concerns

- The Territory Tracking and Restriction System runs in the privacy of the user’s home
- The user chooses to run the Territory Tracking and Restriction System
Manufacturability, Sustainability and Economics

- **Manufacturability:**
  - Can be created in mass quantities
  - Information programmed on PIC

- **Sustainability:**
  - Battery can be replaced
  - Information can be stored on the computer

- **Economics:**
  - Low material cost
Overview

- Problem and Requirements
- Design Alternatives
- System Description
- Design Outline
- Project Scheduling
- Testplan and Demonstration
- Team Management
- Project Concerns
Any Questions?