Objective

Team A&B: EZ Pet Entryway

General need for product
Conventional pet entrance ways lack adequate security, insulation and accessibility.

Market Size
• Approximately 63 percent of U.S. household have pets.
• Americans expenditure for pets would reach $56 billion by the year 2014 (American Pet Products Association)

Constraints
• Door Size
• Weight
• Sensor Range

Customer Requirements
Secure locking system  Ease of use
Durability  Price
Weight  Aesthetics
Low noise level  Waterproof

Objective

Concept Generation

<table>
<thead>
<tr>
<th>Concept 1</th>
<th>Concept 2</th>
<th>Concept 3 (Final Design)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track and Roller Design</td>
<td>Chain system</td>
<td>Rack and Pinion system</td>
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<tr>
<td>Motor releases lock and raises the door</td>
<td>Driven by a motor with a shaft linking the two chain systems together.</td>
<td>Push-pull solenoid locking mechanism</td>
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<tr>
<td>Pros: Effective locking mechanism</td>
<td>Pros: Simple design</td>
<td>Pros: Simplicity of design, locking and drive system</td>
</tr>
<tr>
<td>Cons: Complex design</td>
<td>Cons: Poor locking mechanism</td>
<td>Cons: Weaker guiding system</td>
</tr>
</tbody>
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Reason for Final Design
• Design addressed the needs identified in market: security, insulation and accessibility
• Cost of manufacturing

Design

Operation of the Product
• Motor of pet entrance way activated with an RFID reader
• Door opens once appropriate tag is detected and ultrasonic sensor keeps door open until pet is clear
• Arduino (microcontroller) used as control unit for RFID, sensors and motor

Key Innovation
• Automated pet entrance that provides security, ease of use and insulation.

Prototype and Testing

Parameters Tested
• Detection Range of RFID Reader
• The receiver is able to detect a unique tag

Accuracy of Ultrasonic Sensor
• Calibrated the ultrasonic sensor

Test Results and Future Work

Design Process Summary
• Identified the need for a more secure pet entrance way.
• Selected final design utilizing HOQ and AHP.
• Satisfied the customer need by addressing customer requirements in design

Future Work
• Customer feedback
• Lifecycle tests
• Implementing RFID with improved detection range
• Implement a infrared sensor with reduced interference

Reflections
• Patent search provided an overview of existing products in the market
• Prototyping assisted in improving design flaws
• HOQ assisted in identifying important engineering characteristics

ENME472 - Integrated Product and Process Design and Development
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