**Motivation**

Studies have proven that dog feces can carry several types of bacteria, including *Campylobacter* and *Leptospira*, which can be transferred to humans during waste collection. For this reason, an animal waste collection device that will allow the user to effectively retrieve, contain, and secure waste completely hands-free is needed.

**Objective**

- **Product Design Process (PDP)**
  
  A workable prototype was created from standard materials that has the capability of retrieving, containing, and securing canine waste.

  **Recommendations for future design**
  
  - Injection molded external structure and jaws
  - Spring loaded opening mechanism
  - Ergonomic handle

  **PDP reflection**
  
  - Surveys: customer requirements were key
  - Concept generation: brainstorming alternate designs
  - Competitor benchmarking: gain knowledge of pros/cons of competitor tools to improve our tools performance

**Concept Generation**

- **Elements taken under consideration**
  
  - Elongated shape: prevent user from bending-easier for all age groups
  - Heating strip: faster sealing, but pricier tool
  - Notched jaws: more efficient waste retrieval-independent of terrain
  - Hook: to secure drawstring bag

**Customer Requirements (CR):**

- One scoop pick-up
- Ease of deploying new bag
- Works on all terrains
- Minimal contact with used bag
- Light weight
- Carrying comfort

**Customer Needs (CN):**

- Bag availability
- Operational comfort
- Portability
- Drop resistant
- Minimal post-use clean-up
- Minimal contact with waste

**Design**

- **Innovation**
  
  Tool is provided with sealing mechanism to minimize contact with post-waste bag

- **Trade-Offs**
  
  Proposed electronic components for increased efficiency of sealing subsystem; not implemented due to price point and usage of the tool

  **Satisfaction of Customer Requirements**
  
  - Design and capacity of jaws allows for multiple pick-ups per bag
  - Ergonomic shape allows for one-handed use, no bending down, and comfortable grip

**Prototype and Testing**

- **Prototype Performance**
  
  The original prototype was efficient at scooping. For final design, sealing mechanism will be improved, to increase ease of sealing.

<table>
<thead>
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<th>Weight of dropping (g)</th>
<th>44</th>
<th>88</th>
<th>132</th>
<th>163</th>
<th>227</th>
</tr>
</thead>
<tbody>
<tr>
<td>% picked up with first scoop:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On concrete</td>
<td>100%</td>
<td>100%</td>
<td>87.88%</td>
<td>99.88%</td>
<td>100%</td>
</tr>
<tr>
<td>On grass</td>
<td></td>
<td></td>
<td></td>
<td></td>
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**Test Results and Future Work**

- **Test Results**
  
  Statistical results of ease of bag sealing

  **Discussion of Results**
  
  Further testing will reveal overall effectiveness of the tool.

**ENME472 - Integrated Product and Process Design and Development**

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