WheezeSense Algorithm – Home Monitoring Device for Pediatric Asthma

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Problem

- Asthma affects over 6.1 million children and is the third leading cause in hospitalization
- 83,200 ED visits from an asthma attack or episode are "potentially preventable"
- A key symptom of asthma is wheezing caused by mucus buildup and narrowing of bronchial tubes

Objective: Given a sound input, WheezeSense will detect the onset of asthma through the sound of wheezing using a wheeze detection algorithm created by the team.

Solution Design

Prototype sensor records a breathing sound and is connected to the algorithm for analysis following the solution pathway

Results & Impact

Tests in Simulation Lab
- Newborn & Toddler manikins programmed to simulate wheezing
- Operator chooses manikin conditions unknown to team and will confirm or deny determination

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Met: Y/N/TBD</th>
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<tbody>
<tr>
<td>R1 – Code outputs graph with determination of healthy or wheezing</td>
<td>Y</td>
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<tr>
<td>R2 – Algorithm filters &lt;150 &amp; &gt;1000 Hz</td>
<td>Y</td>
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<tr>
<td>R3 – The sensor taking in sound input and creates an audio recording</td>
<td>Y</td>
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<tr>
<td>R4 – False positive rate ≤ 10%</td>
<td>Y</td>
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Parents/Caregivers: Gives parents peace of mind and helps to provide knowledge for when to administer medication or go to the ED.

Doctors/Health Care Professionals: Provides comprehensive patient history based on recorded wheeze data.

Insurance/Monetary Value: Saves money by eliminating preventable ED visits.