Assistive Communication Technology for Amyotrophic Lateral Sclerosis (ALS)

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Clinical Need:
ALS is a progressive neurodegenerative disease that leads to loss of voluntary muscle control and requires the use of communication assistance such as laser pointers, eye gaze technology, and iPad Systems to vocalize patient intent.

Design must include:
- Standard letter board
- Safe laser pointer
- Device operated by head motion

Design Requirements:

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<tr>
<th>ID#</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>1</td>
<td>Head Range of Motion (&lt;70° or within ALS limits)</td>
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<tr>
<td>2</td>
<td>Accuracy of textual &amp; auditory output (100%)</td>
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<td>3</td>
<td>Timeliness of device use (2.3 seconds/character)</td>
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<td>4</td>
<td>Accuracy in all lighting environments (100%, 10-3000 lux)</td>
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Solution:
Our system will be wheelchair mounted and produce a live auditory output of the user's letter selection.

Approach:
Our approach is to develop a MATLAB program that will utilize a laser pointer camera interface to detect letter selections made on a standard communication board.

Results & Impact:
Testing results showed successful accuracy and timing.

Impact: Create an accessible deliverable that caregivers could utilize to create their own assistive communication interface for ALS patients.