

Tactile Chess

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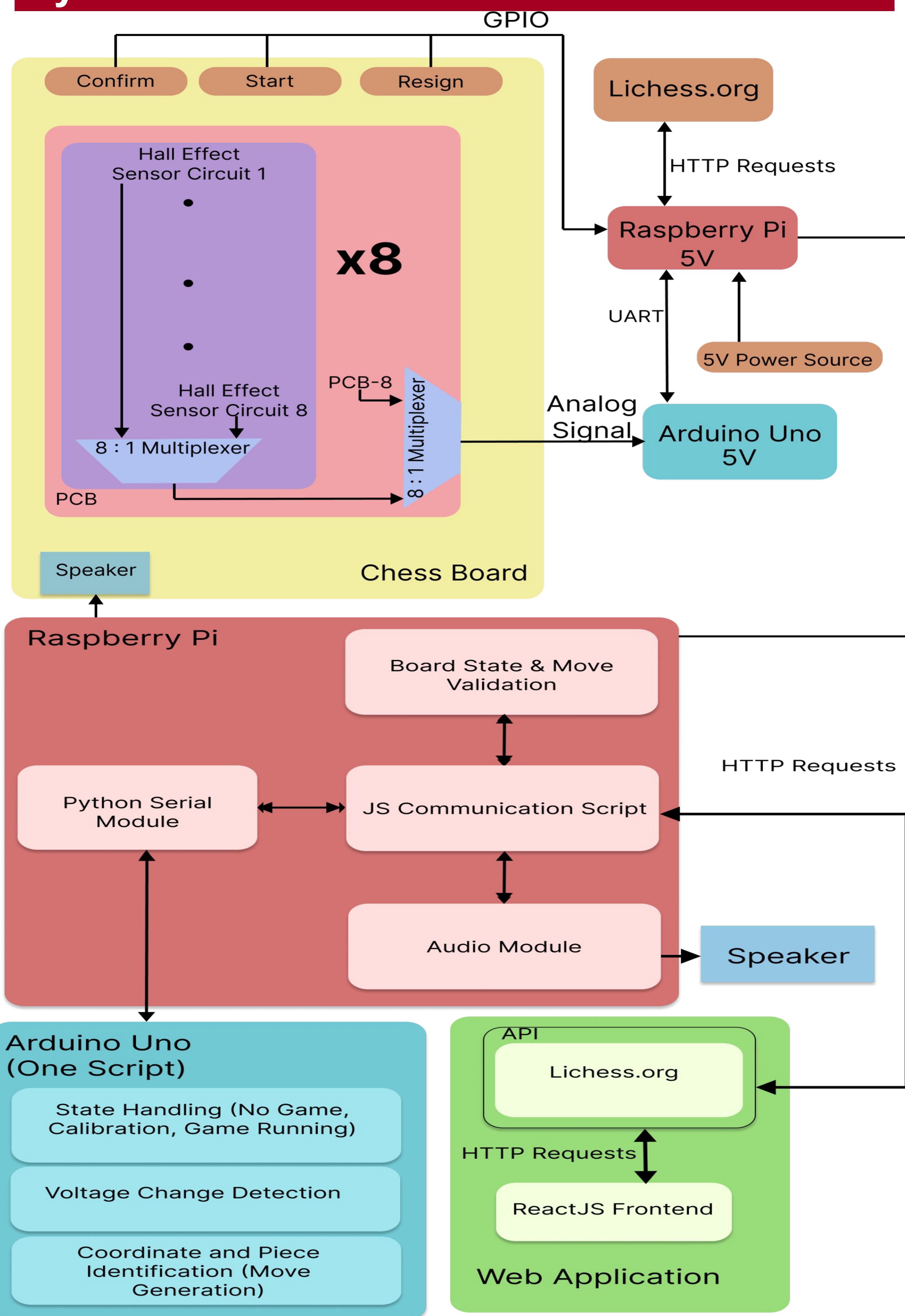


Product Pitch

The online chess community has close to over 1 billion users. We want to bridge the gap between people that are visually impaired and the online chess community using a smart chess board that will allow users to play online chess games using a physical board. We will do this by:

- **Creating a modified chess board and pieces, to accommodate accessible features for blind users**
- **Providing users with a quick and easy set-up experience in under 25s**
- **Designing and fabricating PCBs with Hall Effect Sensors to identify unique chess pieces**
- **Providing users with audio and tactile cues for seamless gameplay**

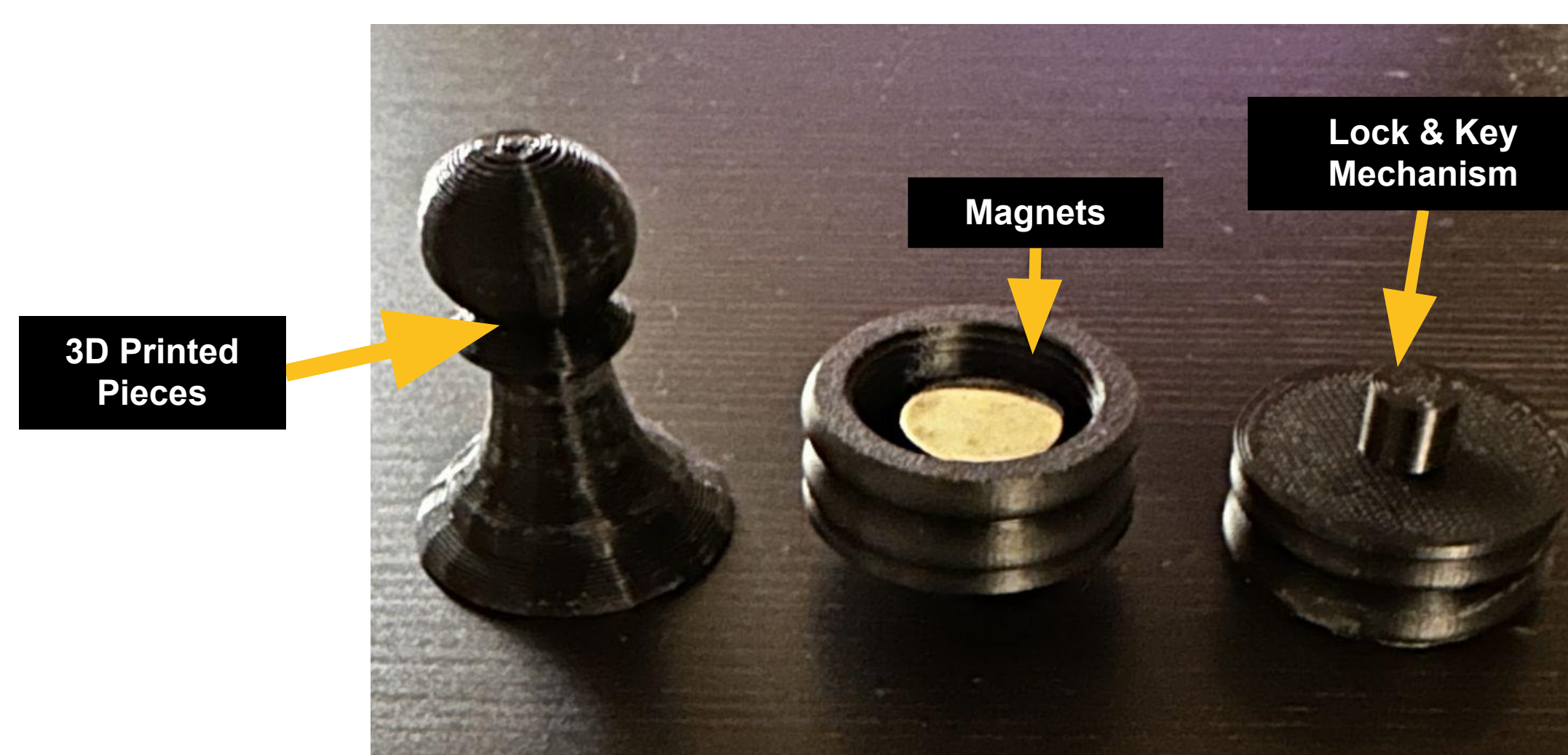
System Architecture



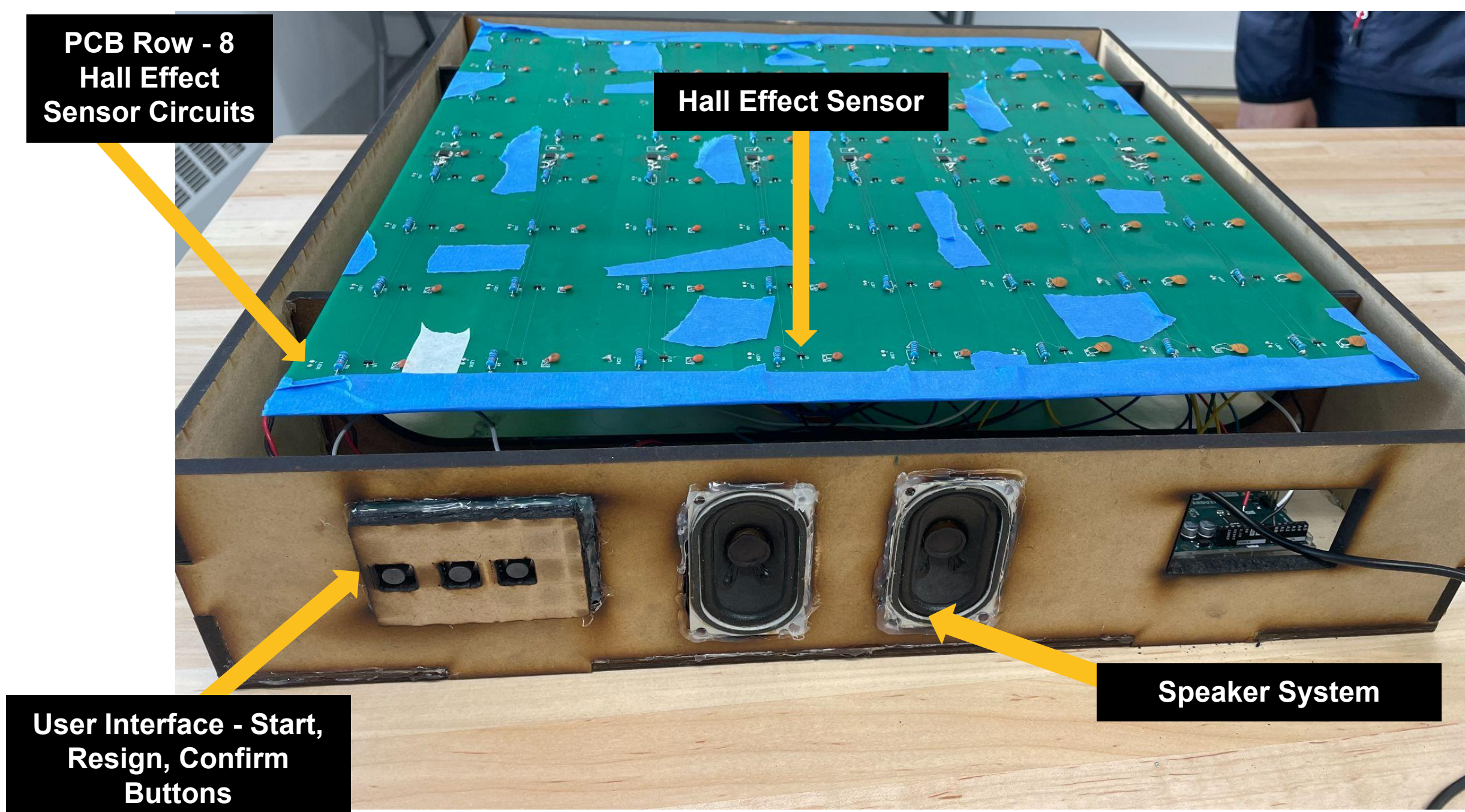
System Description

Our system consists of a Raspberry Pi, an Arduino and a PCB to help create a seamless experience. The PCB is composed of 8 Hall Effect Sensor circuits connected to an 8:1 mux. The outputs of 8 such PCBs are connected to a separate 8:1 mux, allowing us to iterate through the board as a 2 dimensional array. The Arduino helps us iterate through the board, and detect a piece and its coordinates, before sending the information over to the RPi. The RPi handles most of our software subsystems, which helps validate a move and the state of the board, vocalize the feedback to the user, and pipeline data to and from *lichess.org*. With the use of simple components like buttons and a speaker system, the user can control the board, and play a game of online chess, on our physical board.

Piece Design

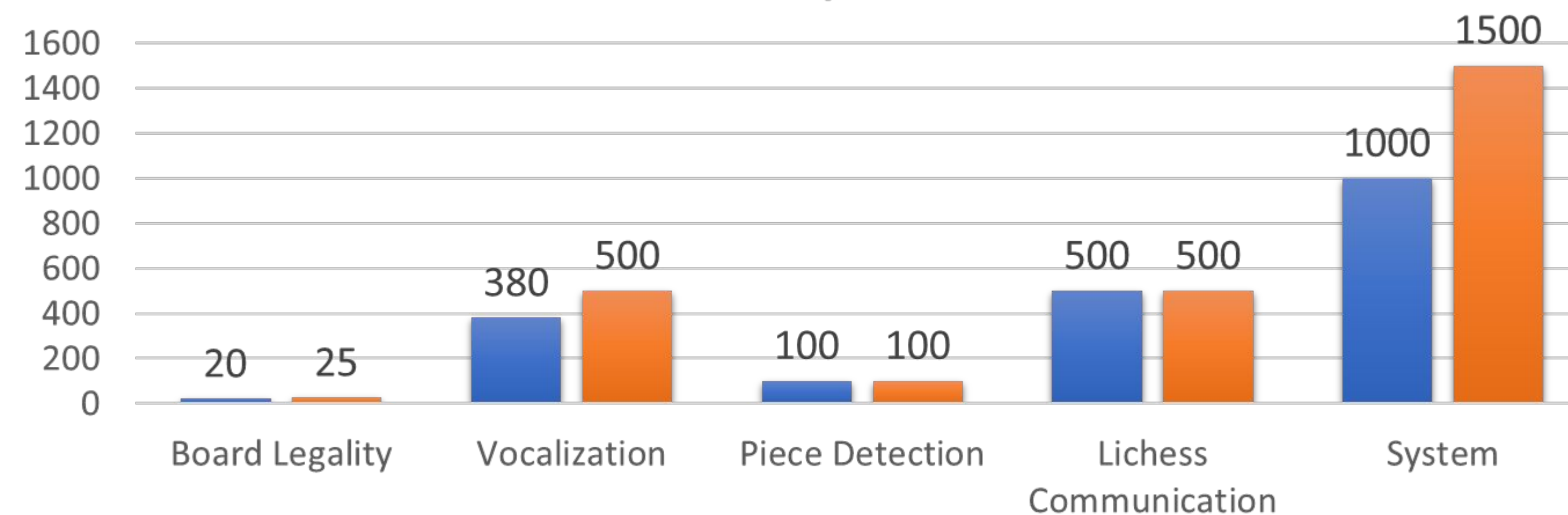


Custom Chess Board with PCB



System Evaluation

Latency Test

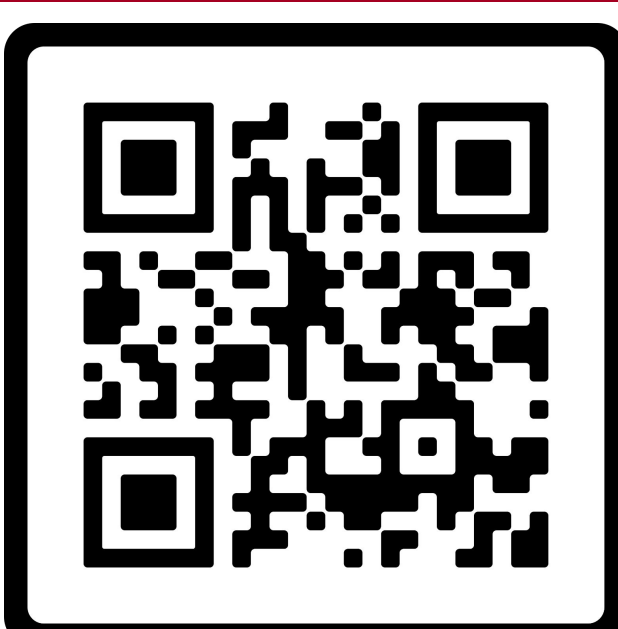


Accessibility & Usability



We asked 40 users (blind users and beginners) if they could identify the type of piece and the type of tile while blind folded

Conclusions & Additional Information



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Our team created a system which allows blind users to play online chess with the help of vocal and tactile cues. We also hope to provide beginner and novice players with visual cues to play a game of online chess. As a team, we learned a series of technical skills including PCB design and fabrication, 3D modeling, and 3D printing. Through our design process, we learned the importance of integration and testing in order to guarantee seamless transition between our subsystems.