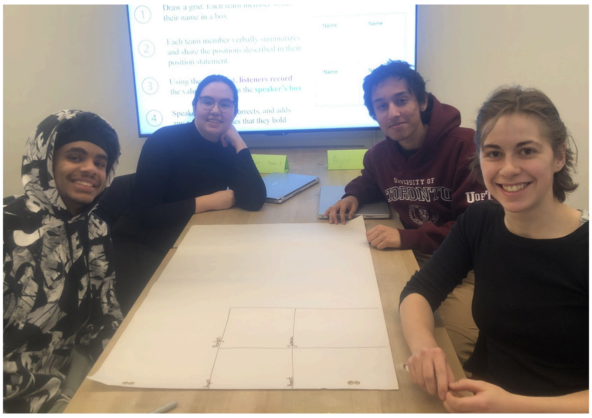

Figure 1: Group photo from first Studio.

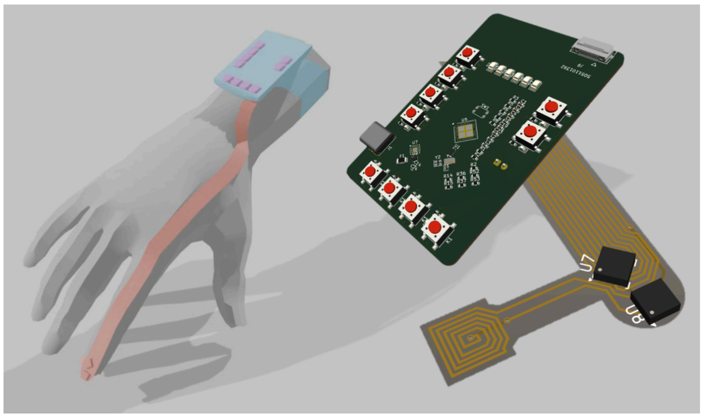

Figure 2: Tacti, Right: Wrist PCB. Bottom: Flex-PCB.

Figure 2 depicts Tacti (Touch-Augmented Chess Recording Interface), it utilizes inertial navigation to track the index finger's position accurately. Upon detecting touch, it records the initial and release positions to determine the chessboard position, converting this data into algebraic notation (e.g., P-e2e4) through a set of algorithmic rules. Tacti offers significant value to stakeholders compared to other chess recording devices due to its superior accuracy, FIDE (Fédération Internationale des Échecs) compliance, and versatility.

Existing move recording solutions generally fall into three categories: sensing array boards, computer vision, and touch interfaces. Sensing array boards require non-FIDE approved chessboards, which track piece movement through magnetic induction. These boards need special permissions for competitive use and are often limited to chess only. In contrast, Tacti complies with all FIDE-approved recording device regulations and retains functionality beyond temporary afflictions (as is the condition of our stakeholder), applicable to other games for move tracking. The underlying process that Tacti uses can be generalized to any game involving positional move tracking, with algorithmic rules adaptable to the specific context. This versatility broadens its appeal beyond chess players who cannot write moves with their dominant hand and further opens opportunities for "game trainers" that provide real-time feedback based on player moves.

Computer vision systems introduce uncertainties and are sensitive to variables like piece shapes, colors, hand movements, and lighting, making them unsuitable for competitive environments due to calibration time. Tacti uses a short calibration method, requiring users to touch two corners of the board to establish the "playing-board plane." A solution that is even 100% accurate is insufficient for chess move recording as a single error can lead to significant disputes, meaning data backups are required. Tacti records all inertial navigation data as .txt files as a backup, which scale to kilobytes of space, while video as a backup can scale to terabytes, making them impractical for stakeholders at the Hart House Chess Club, involved in smaller competitions with limited funding.

Touch interfaces such as those mobile applications are adequate but inferior to Tacti, as they still require time to record a move. Tacti operates without cognitive load, sensing movements as a typical player would—by picking up pieces with their index finger and thumb, moving them, and releasing them. This feature broadens Tacti's appeal, allowing use by players with and without afflictions. The Hart House Chess Club aims to increase participation, while other solutions offer similar capabilities, touch arrays impose cognitive load, and both computer vision and sensing array systems are prohibitively expensive for the club. Tacti circumvents all of these issues and thereby lowers the barrier to entry to get more people involved with chess.

It is essential to reduce complexity to ensure that genuine value is realized. Our team has maintained a strong awareness of the phenomenon where the actual complexity of a given design is often downplayed in high-level discussions. From the outset, we have thoroughly scoped existing solutions (see figure 3) through comprehensive PCB design, CAD design, calculations, firmware finite state machine analysis, and other methods. This approach has allowed us to accurately represent complexity and maintain the highest possible level of value for our stakeholders. When this approach fell short, we explored innovative concepts, such as EEG (Electroencephalography) headsets, and adapted the principles of human-wearable technology to develop a viable solution, ensuring that we conducted low-level design scoping.

We believe that our in-depth design work at this level is rare, and our keen awareness of the phenomenon of complexity truncation has enabled us to create substantial value for our stakeholders.

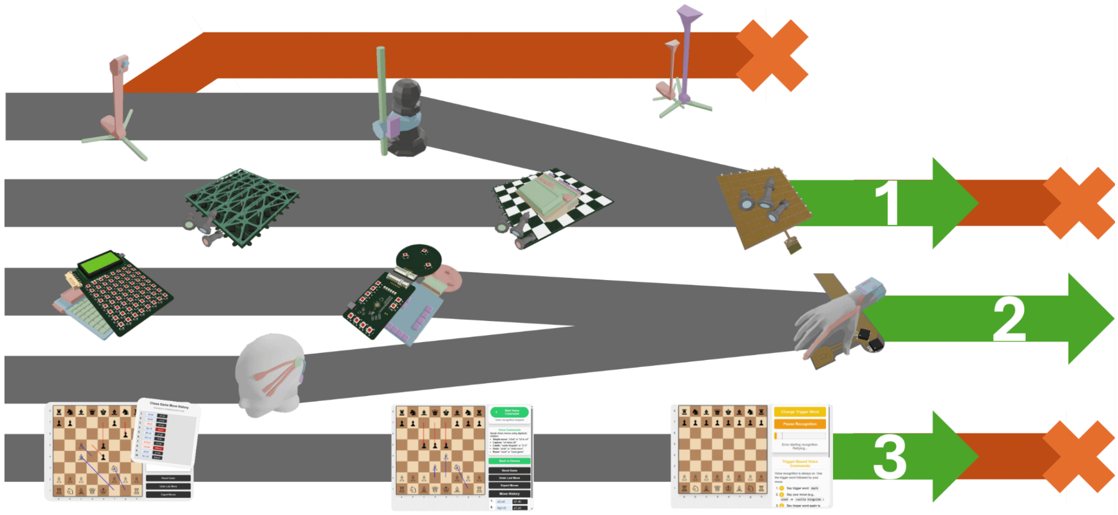

Figure 3: Branches of convergence and divergence throughout our design process

Our team leveraged our diverse backgrounds in our design work through open communication. At the start of the term, we discussed our experiences in Praxis I, what we learned, and our goals for Praxis II. We unanimously agreed that we wanted more than just a grade and aimed for the ROWE Award. This conversation set the tone for our future meetings, creating the psychological safety needed to voice our thoughts and draw from our diverse experiences. For example, during the diverging process, we used the word “chiffon” (a type of fabric) as input for the “random input” tool, inspired by a team member’s background in sewing and this led us to our sensing array idea, which we presented during the beta release.

The Annex Chess Club presented an unexpected opportunity for our team to reinforce our core values. From the beginning of praxis, we established that social justice was not only a fundamental principle but also a key aspect we aimed to integrate and reflect in our work. In selecting the appropriate RFP, the opportunity to align our core values and beliefs with our project was a significant consideration. We believe this RFP allows us to grow collectively, as each phase of the process not only embodies our team values but also represents the individuality of each team member. During our reflection on Beta, we realized that our collaborative efforts were a true reflection of our identity. Many of our designs incorporated technologies aimed at enhancing the quality of life for users, adhering to ethical standards and legal regulations while addressing edge cases. Our success with beta can be attributed to our engagement with an RFP that resonates deeply with all of us: the desire to leave the world a better place than we found it.

Our commitment to assisting individuals with disabilities in engaging with chess led us to develop a profound understanding of the challenges faced by this community. As our team focused on creating a tool that enables users to record their chess moves, we recognized the importance of a validation process that would empower users to maintain their independence and return to their daily routines. By researching the rules and regulations pertaining to the needs of injured and disabled players, we gathered valuable insights that informed our design process, ensuring the product was both functional and user-friendly. Through this project, we collaborated and demonstrated a genuine commitment to making a positive impact in the lives of individuals with disabilities. The project not only facilitated their participation in the chess tournaments but also conveyed a message of inclusion, underscoring our dedication to supporting every member of our community.

We were unable to meet with our community as our RFP Coordinator was unable to get in contact with them, instead we met with members of the Hart House Chess Club. Our goal was to understand the challenges faced by those who struggle to record their chess moves and to gather feedback on their experiences. During these visits the enthusiasm of the discussions not only encouraged us but enabled us to develop key insights into the game which we wouldn’t have obtained otherwise. From the information obtained at Heart House we were able to reform our framework of our design to better comply with the values of the stakeholders and the regulations of FIDE. Given the success of the first two visits we are excited to test verification and validation procedures with the community on 2025/04/04 in order to obtain the feedback necessary for the Showcase.