Final Project Proposal

Year: 2020 Semester: Fall Team: 22 Project: Social Distancing Chess

Creation Date: 8/27/2020 Last Modified: 8/27/2020

Team Members (#1 is Team Leader):

Member 1: Matthew MacLean Email: macleanm@purdue.edu

Member 2: Ian Haggerty Email: ihaggert@purdue.edu

Member 3: Daniel Burger Email: burger5@purdue.edu

Member 4: Fischer Bordwell Email: fbordwel@purdue.edu

1.0 Project Description:

Social distancing chess would be a pair of chess boards that are able to interface with your phone in order to facilitate long-distance play. Each player would use an app on their phone to connect to their board via Bluetooth. They would then be able to move their pieces on the board to send their move to the other player. The movement of their piece would be registered via hall effect sensors, which would detect magnets within the physical pieces. The two sides would have different magnet polarities, allowing ambiguities when capturing pieces to be detected. This movement would be condensed down to chess board notation in software, and sent via the app to the other player’s board. A connected LCD screen would assist with moves, as well as inform the player of their opponents moves, alternating until the completion of the game. The app would handle communications, starting games, and confirming turn completion.

This kind of interaction would enable players to interact with both another person, and also the physical components of the game board.

2.0 Roles and Responsibilities:

1. Matthew MacLean has experienced numerous leadership experiences through his time as a section leader in the Purdue Jazz Band. Having gone through two internships in System Verification at Qualcomm and Shure respectively, he has extensive experience in software and hardware testing. He has created a sampler with a microcontroller, and has written simulation software to be used with scalability testing for large systems. With his background, he will serve as the Team Leader, as well as provide additional software engineering support.
2. Ian Haggerty has worked on the design of chemistry instruments through his job as a Software R&D intern at Beckman Coulter Life Sciences, and is currently remotely designing the user interface for an exciting new instrument in the genomics market. His exposure to firmware engineers, mechanical engineers, chemists, and manufacturing experts through this project has made him knowledgeable in systems, and will make him valuable in coordinating and combining the work of each team member. Ian also maintains the software autograding infrastructure for ENGR 16x classes, and contributed to building a medical software microservices architecture as an intern at SEP.
3. Daniel Burger has taken numerous courses in circuit design and completed a microcontrollers course. With his deep understanding of circuits and microcontrollers, he will be the hardware engineer. Under this role, Daniel will utilize his experience in classroom projects of building a push bar alarm system, terminal arcade game with MIDI music, and a time resolved light triggered Cryo-EM plunger used in a biology research team to come up with unique and optimized hardware solutions throughout the length of the semester.
4. Fischer Bordwell has experience in embedded system design from computer engineering courses and his research. He is in CAM2, Dr. Yung-Hsiang Lu’s undergraduate research team, where he has performed research on computer vision on low-power embedded devices. He also has deep experience in both C and C++. He will use this experience as the software engineer of this team, and will develop the core functionality of the software used in the board.

2.1 Homework Assignment Responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| *Design Component Homework* | | *Professional Component Homework* | |
| 3-Software Overview | FB | 9-Legal Analysis | MM |
| 5-Electrical Overview | MM | 10-Reliability and Safety Analysis | IH |
| 7-Mechanical Overview | DB | 11-Ethical/Environmental Analysis | FB |
| 8-Software Formalization | IH | 12-User Manual | DB |

FB - Fischer Bordwell, DB - Daniel Burger, IH - Ian Haggerty, MM - Matthew MacLean

3.0 Estimated Budget

|  |  |
| --- | --- |
| **Item** | **Estimated Cost** |
| ***Electrical*** |  |
| Hall Effect sensor x128 | $110 |
| RGB LEDs x128 | $120 |
|  |  |
| ***Misc*** |  |
| Chess board x2 | $40 |
| Disc Magnets x64 | $40 |
| Shipping | $50 |
|  |  |
| **Total** | $360 |

4.0 Project Specific Success Criteria

The following project specific success criteria are proposed for Social Distancing Chess:

1. An ability to monitor movements of pieces on the chess board using magnetic sensors.
2. An ability to communicate to a paired phone via a Bluetooth connection.
3. An ability to process and display moves made by an opponent.
4. An ability to communicate board state information between users via a smartphone App.
5. An ability to display movement and connection information on a connected LCD display.

5.0 Sources Cited:

No external works were used to write this report.