ECE 445 SP23
Team Contract Fulfillment
Autonomous Card Dealer

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Project Goals:

The goal of this project was to design and implement the various hardware and software components of the Autonomous Card Dealer (ACD). Essentially, the ACD will provide its users with an efficient, customizable, and user-friendly experience. The mechanical hardware components include a card shuffler, rotating base servo, and card dispenser mechanism, controlled by the STM32 microcontroller and the Motor IC units. The sensing hardware component used for the ACD is an ultrasonic sensor, capable of taking distance readings and confirming players. The user interface hardware component used for the ACD is a 16x2 Liquid Crystal Display (LCD) and four (4) push buttons, capable of displaying messages to the User based on the button pressed. The software components consist of various methods to automate the card shuffling and customizable dealing process, in which primitive functions are scheduled and executed. The project results demonstrate the feasibility and potential of ACDs for the automation of various card games.

Expectations (ground rules) for each member:

Communication. We communicated clearly through Discord and text messenger whenever matters came up or updates/questions needed to be shared. We met weekly and made sure to respond promptly (usually within our set 6 hour timeline). Whenever conflicts or questions would rise, we quickly brought them up to our TA.

Participation. Everyone put in a good share of work and all participated in team meetings. All designated tasks were completed in a timely manner for each individual.

Accountability. Each team member kept the team updated on individual tasks throughout the weeks. Whenever any of us were not able to finish a task on time, we made sure to bring it up to the team and create a solution. Weekly tasks were split up among the group by the end of the weekly TA meeting consistently.

Documentation. Each team member kept a well documented notebook/github repository. In addition, information (design considerations and fixes, and verification processes) was well documented in our group messaging platforms. A dedicated Google Drive folder was maintained, consistently updated before and after the weekly TA meetings.

Testing. Each team member has collected video footage, pictures, and measurements for whatever subsystems they might have been working on. All of these have been put into the “Test Data” folder on Google Drive, and we plan to continue to add to it as we finish the project.

Feedback. After our weekly meetings, we took an extra 5 minutes to review each member’s performance with contributions to the team. Whenever negative feedback was received, we all made note of it and actively improved upon it.

Respect. During team meetings and discussions, each team member communicated with respect and listened to what others had to say without making any unnecessary judgments.

Roles:

In the beginning, we said that we would work on the PCB and documentation together and then split up the actual project work. We decided to split up the project work to the ultrasonic sensor, card shuffling mechanism, and card dealing mechanism. However, as we progressed through the project, this didn't seem like the ideal way to split up the work. We did work on PCB and Documentation as a group which made it more efficient. But we also worked on shuffling/dealing with related motor control as a group because our device is already all put together so it would be a hassle to transport the whole device. We also worked on the code together as we wanted to make sure it was structured well. We did split up the other portions such as the Ultrasonic Sensor, Servo Motor, and LCD display among us though, as that allowed us to be more efficient. We didn't really have a group leader, we just communicated amongst ourselves and with our TA.

Agenda:

Whenever making executive decisions about the project or coming along with any issues, we first made sure to bring it up to the team and discuss it as soon as possible. Once we came to a conclusion about our decision or the issue we were fixing, we brought it up to our TA through Discord or during our following team meeting. During each team meeting, we discussed our tasks/goals as a group and individually and kept track of them on a Google document shared between the three of us.

Team Issues:

Our group ran into a problem with our PCB. The parts we ordered were not the right fit for the PCB, making it difficult to solder together. Obviously, if we were to redo this project again, we will be more thorough in checking footprints. We aimed to get microcontroller code working onto a NUCLEO-F411RE to ensure that we have proof of concept for the minimum viable product while making the goals of the project more complex. One design consideration was to include a Liquid Crystal Display instead of a Seven Segment Display to allow for a better and more efficient User Interface. Another design consideration was to include multiple game mode support and a confirmed player's location functionality. We feel like we did follow the process that was set out in the team contract. Outside of this, we didn't really have any non-technical team-related issues that we had to deal with.