

SDP22: Team 20

# JACKBLACK

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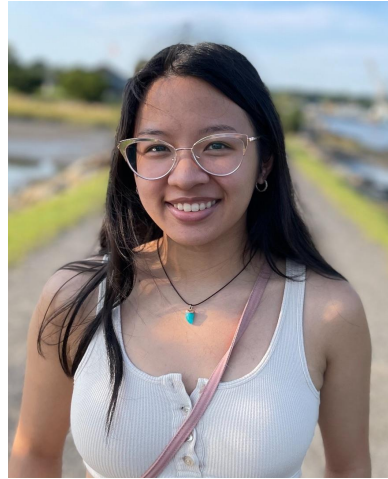
Advisor: Bill Leonard



# Meet the Team



**Ray Castillo**  
Computer Engineer



**Alina Daraphet**  
Computer Engineer



**Lamisa Sheikh**  
Electrical Engineer



**Marvin Nguyen**  
Computer Engineer

# Problem Statement

When playing Blackjack among friends, the issue of who will be the dealer always arises. The job of the dealer includes:

- Dealing and shuffling cards
- Collecting and counting chips

These are tedious tasks that most players do not want to take on.

# Our Solution

We are proposing an automated Blackjack system that has the following features:

- Automated shuffling and dispensing system
  - Users input the deck into the dispenser and the cards will shuffle and dispense themselves to each player/dealing system
- No chips (non-physical betting; using play chips in system)
  - Incorporate the betting system in a virtual environment

# Competing Solutions in the Marketplace

- [VideoPokerTable.net](#)
  - Sells kits to create your own RFID-driven poker table
  - Users have to build their own table
  - Can only be used for poker
  - Cards aren't automatically shuffled/distributed
  - Expensive ( ~\$1550 for a 4 player table)
- [Interblock Automated Casino Games](#)
  - Sells automated single-game tables (Blackjack, Craps, Roulette)
  - Aimed towards actual casinos; consumers looking to purchase for personal entertainment cannot

# Project/University Solutions

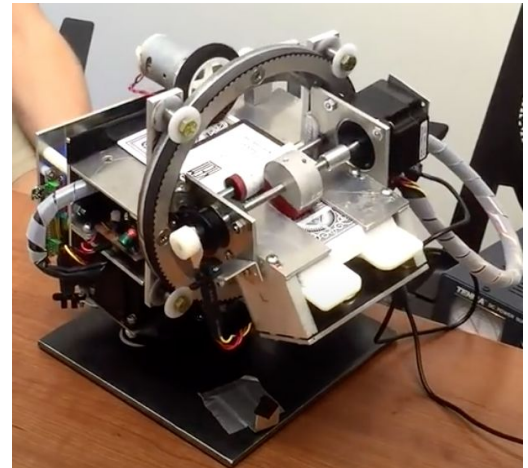
Automated Casino games such as Black Jack and Card Dealers have been researched before by other universities.

## University of Waterloo: Automated Blackjack Dealing System

- Automated black jack; completely removed dealer aspect
- Image recognition system, rotating wheels/motors, buttons, Matlab

## Purdue University: Automated Card Dealer

- Mechanical project; card dealer rotates and turns
- Capable of flipping over cards before distributing
  - (for games such as black jack)



# Where We Differentiate

- Our system will be tailored for recreational playing and learning, rather than for casinos
- The Purdue University project flips cards which is very mechanical. It also is one central system, where we are incorporating other ECE components such as UI, a modified shuffler/distributor, and identification methods into a table/game system.

# Preliminary System Specifications

1. Automatically shuffle all cards loaded into the system.
2. Transfer cards from shuffling system to dispenser without dropping any cards.
3. Automatically dispense cards to community/dealer as well as dispensing cards across the table to the player's designated section (within 6 inches from the player's screen/designated area, without having cards fall off the table, and allocating the correct number of cards to each player).
4. System will stop once an "end" state is reached.
  - a. "End" state can be reached by:
    - i. A button on the UI, where a majority of players can vote to end the game
    - ii. When a player's total winnings reaches the "winning amount"
    - iii. After a certain amount of games (user inputs number of games)
    - iv. Players can input duration of play before end game (e.g. 1 hour of playtime)
  - b. On game end, display on UI: Total winnings, "play again", "exit"

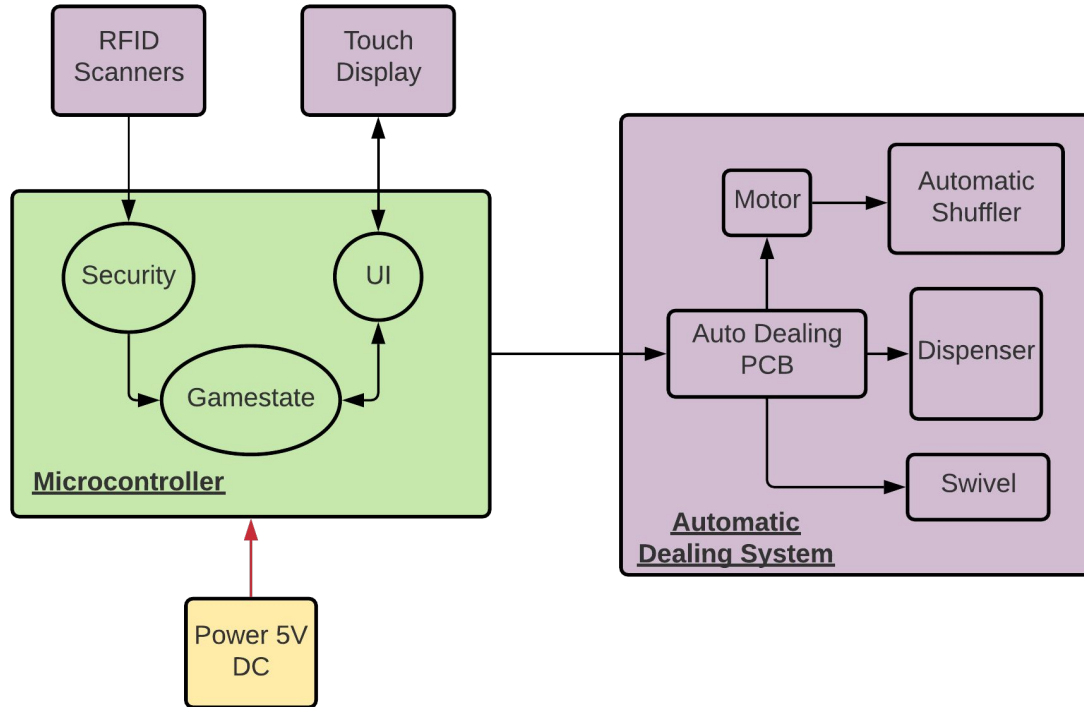
continued...



# Preliminary System Specifications Cont...

5. System will identify cards by their number/letter and suit with 99% accuracy of recognition.
6. System will engage with the user by the following:
  - a. Display wins/player money
  - b. User input (Betting / Player Moves)
  - c. Help guide to teach new players
  - d. Asking the number of players (1-4 players)
  - e. Asking for house rules
7. Players will not be able to substitute cards from another deck into the system deck.
8. System will organize betting virtually and display values through UI:
  - a. Each player will have their own touch display.

# System Block Diagram



Method 1:

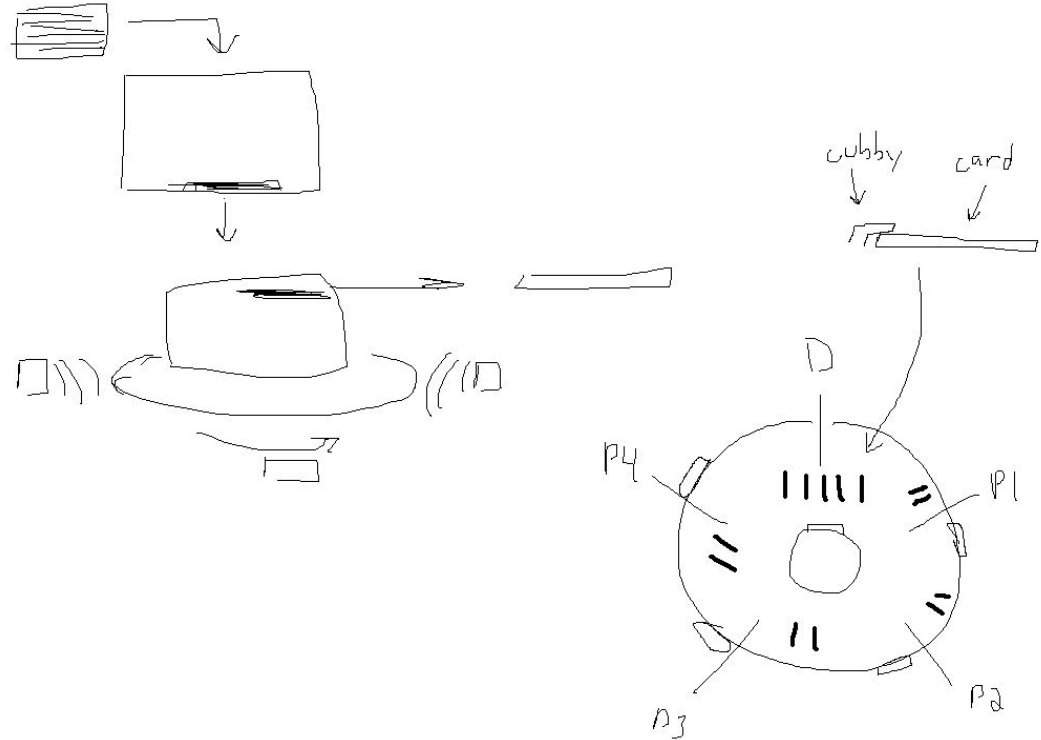
- UNO Dispenser

Method 2:

- Creating dispenser based off UNO dispenser

# Automatic Dealing System Explained

- Cards are loaded in to shuffler
- Cards are delivered in to dealer
- Dealer is on a swivel that is assisted by magnets to align to players
- Cards are delivered face-down to players and dealer/community
- Players are expected to manually align cards to RFID zones
- Dealer/Community zone has a "cubby" to better hold cards



# Game Theory Algorithm

For all our card game the system must know the “win conditions”. That is how the system will determine who the chips go to.

The win condition of blackjack is to achieve a score of 21. That occurs when the value of your cards dealt to you reach this value.

The other system that has to be taken into account is that the dealer plays as well. But it is not hard to determine when the dealer hits because there is a system in place. If the dealer is under 17 they hit.



# Significant Custom Hardware Design

Input: Card Identification, Touch Screen

Output: Touch Screen, Auto Shuffler

Provides power to all systems.

Need multiple PCBs, ideally one for card identification, one for the Touch Screen/GUI, one for dealing system

# Proposed MDR Deliverables

- GUI prototype for touch display
- Game algorithm for Blackjack
- Functioning card dealer and shuffler able to dispense cards one at a time at a distance of about two feet
  - Dealer and shuffler should be controlled by a button
- Card identification able to get specific card number and suit

# Cost Estimates

Item	Quantity	Cost/item	Total
Table	1	\$50	\$50
<a href="#">RFID Cards</a>	1	\$45	\$45
<a href="#">RFID Scanners</a>	13	\$0.82	\$10.66
Card <a href="#">Shuffling</a>	1	\$11	\$11
Card <a href="#">Dealing</a>	1	\$25	\$25
<a href="#">Screens</a>	4	\$25	\$100
PCB		\$100	\$100
Total			\$341.50

# Technical Responsibilities

## Ray

- Budget Lead
- Card Identification System and Testing

## Lamisa

- Team Coordinator
- Card Shuffling
- Dispenser
  - Dispensing to players, community, dealer
  - Moving parts

## Marvin

- PCB Lead
- Game Algorithms
  - Betting System
  - Black Jack

## Alina

- GUI Interface
  - Touch display of game selection
  - Software interface w/ microcontroller and game play



Gantt Chart

Overarching category	Task	Team Member	Sept 26 - Oct 2	Oct 3 - Oct 9	Oct 10 - Oct 16	Oct 17 - Oct 23	Oct 24 - Oct 30	Oct 31 - Nov 6	Nov 7 - Nov 13	Nov 14 - Nov 20
Software Game Play	Black Jack Algorithm	Marvin	x	x	x	x				
Integration/Communication	Software interaction between GUI and Games	Alina	x	x	x	x				
Display/Touch Interface	Touch GUI Design and Prototype with RPi	Alina			x	x				
Integration/Communication	Communication with RPi and Software	Marvin, Alina					x	x	x	x
Integration/Communication	Integrating Pre-Built Shuffling and Dispensing system	Lamisa		x	x	x				
Sensing	RFID Card Reading	Ray				x	x	x		
Sensing	RFID System Testing	Ray					x	x	x	
Sensing	Table Prototype	Ray, Lamisa	x	x	x					x
Integration/Communication	Integrating Pre-Built Card dispensing System with Hardware/Table	Lamisa					x	x	x	

# References

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- [4]*Youtube.com*, 2021. [Online]. Available: [https://www.youtube.com/watch?v=zfQ\\_hifbcZw&feature=youtu.be](https://www.youtube.com/watch?v=zfQ_hifbcZw&feature=youtu.be). [Accessed: 29- Sep- 2021]
- [5] "Automated Blackjack Dealing System," *Systems Design Engineering*, 21-Aug-2013. [Online]. Available: <https://uwaterloo.ca/systems-design-engineering/current-undergraduate-students/courses/workshop-projects/fourth2011/automated-blackjack-dealing-system>. [Accessed: 30-Sep-2021].



Questions?



THE END!

