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<center>Project Proposal : Magician's Assistant</center>

The Problem

One of the best parts about trading card games: collecting hundreds of your favorite cards! The problem: Holding all those cards in hand is unbelievably unwieldy. Players often complain that nothing short of an octopus could hold a whole 100-card deck, let alone shuffle them in games. To add to the struggle, the cards in these games are very valuable and often expensive. Throughout the games, players will often have to search their libraries for cards, shuffle decks, and manipulate the positions of cards. After spending countless hours (and dollars) collecting these treasures, players see bending a card akin to shredding and burning it.

Proposed Solution

For my project, I would like to design what I'll call the Magician's Assistant to introduce some quality-of-life conveniences that human dexterity simply cannot. In practice, a player would place their deck into the Magician's Assistant, turn it on and start making requests either with the physical onboard buttons or with the mobile partner app. Players often need to shuffle the whole deck, move just the top card, deal hands, and sometimes even peek at a card without other players seeing it. Cameras mounted within the device would display cards in real-time on its displays so that players could make decisions based on what they see, and finally the Magician's Assistant would deliver variable amounts of cards to players as requested.

Deliverables + Success Criteria

By this project's end, I would like to have a completed device that can carefully manipulate trading card decks without damaging them. Additionally, I would like to be able to connect the device to players' phones so that they can remotely operate it from across tables. I would consider the Magician's Assistant successful if given an ordered set of cards it can shuffle the cards well enough to minimize any semblance of the original order. The primary goal of this project is to speed up the shuffling process, so I would also like to ask various players to time themselves shuffling their decks to have some data to compare to.

Development Plan

 I would start by familiarizing myself with the microcontroller that we're using up to the point where I can understand how to make it read simple input data like button presses, and output something simple like an LED blink through its ports. Next, I would want to make it so that the LCD screens would echo data from the input for easier testing down the line. From there I would want to start drawing designs for the physical apparatus that can move cards around. At present, I'm imagining that the device will use a rubber tipped "finger" that will swipe along the tops of two halves of the deck. This way when shuffling the device can randomly swipe the top card of either side of the deck into the center and eventually combine the pile. So at this point in development I would want to make a chassis that can hold the cards and the finger and then start putting circuits together. Once that's done I would move

into coding the microprocessor to operate this mini prototype to see if that is viable. Once the card swiper is done, and the push buttons attached, I would want to start connecting the Magician's Assistant to Wi-Fi/Bluetooth for mobile controlling.

Resource Requirements

 I would suspect that this project would require the following:

3D Printed Chassis + Armatures	4x Servo Motors, Mounts	2x Small DC Motors, Mounts
Wi-Fi module	Small Digital Camera	LCD Screens
6x Pushbuttons	LEDs for status indicators	Power Supply

Scheduling + Budget

Phase 1: Learning How to Communicate with/through the Microcontroller (1-2 weeks)

Phase 2: Connect Microcontroller to LCD and Pushbuttons + Brainstorm Actuator Ideas (1 week)

Phase 3: Connect Chassis Components for Rough Prototype (1-2 weeks)

Phase 4: Connect Prototype to Mobile Device (1 week)

Phase 5: 3D Printing Final Chassis Design (1-2 weeks)

Phase 6: Adding in Bonus Features (Lighting, Cameras, User-Friendly Display) (3-4 Weeks)