# ECE 445 Project Proposal

## Poker Chip Counting Companion

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# 1.1 Objectives and Background

## Goals: *What problem is being solved?*

- Before, during and after every Texas Hold'em Poker game, we have to hand count different colored chips that equate to different cent/dollar values.
- Hand counting chips when setting up a poker game is a cumbersome task that is time consuming and can lead to mistakes.
- Calculating the exact distribution of chips, and buyouts for multiple people can result in errors such as players receiving too little or too many chips, or the wrong payout.

## Functions: *What is the product supposed to do?*

- The Poker Chip Counting Companion will accurately dispense poker chips based on user inputs about the game such as the buy-in and big/small blind metrics (Dispensing State).
- The device will also calculate the appropriate amount of each color chip required which takes the guess-work out of figuring out the proper chip stacks when starting a game.
- At the end of a game, the device will switch to a buy-out operating mode (Collection State), which will then correctly count the remaining stack sizes of each player. The entire machine will be powered from the USB-C Power Subsystem.
- The user interaction will occur through the web app subsystem, connected to the machine via a bluetooth connection, where a user can input information, control the state of the machine, and receive information about the game.

## Benefits: *How is it good for the consumer?*

- The Poker Chip Counting Companion reduces the amount of time needed to set up and end a poker game, hence increasing their willingness to play.
- It correctly counts chips so the players can guarantee that they are receiving the proper amount based on their buy-in.
- The web React application makes it easy for the consumer to interact with the machine.

## Features: *What aspects make it marketable?*

- With a total cost under $150, and no major existing competitors in the market, this can be a viable product for any poker player in the consumer market.
- The average poker player doesn't understand the rules behind distributing chips or buyouts; the companion can reduce that barrier to entry by doing all the grunt work, and allowing players to focus on the game itself.

# 1.2 Visual Aid

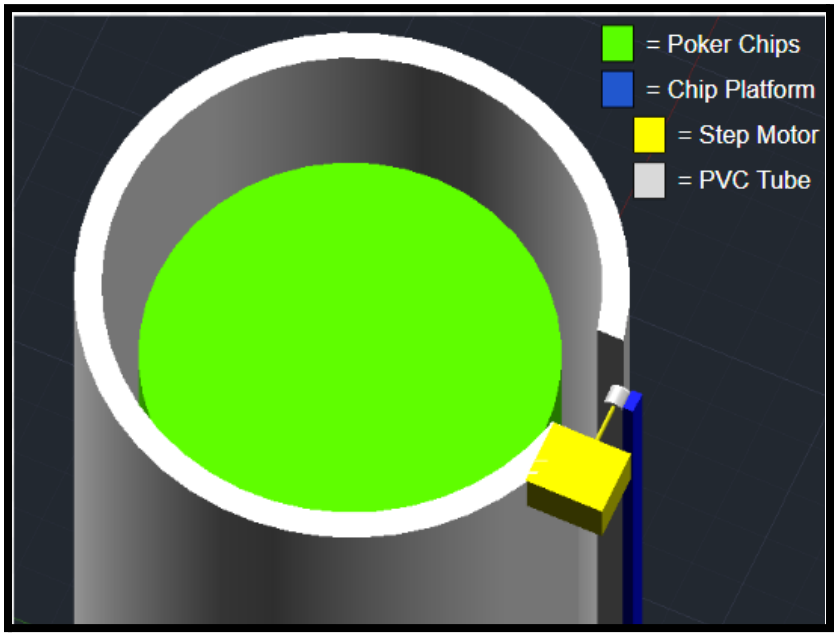



Figure 1: Close up of motor mounted to PVC tube

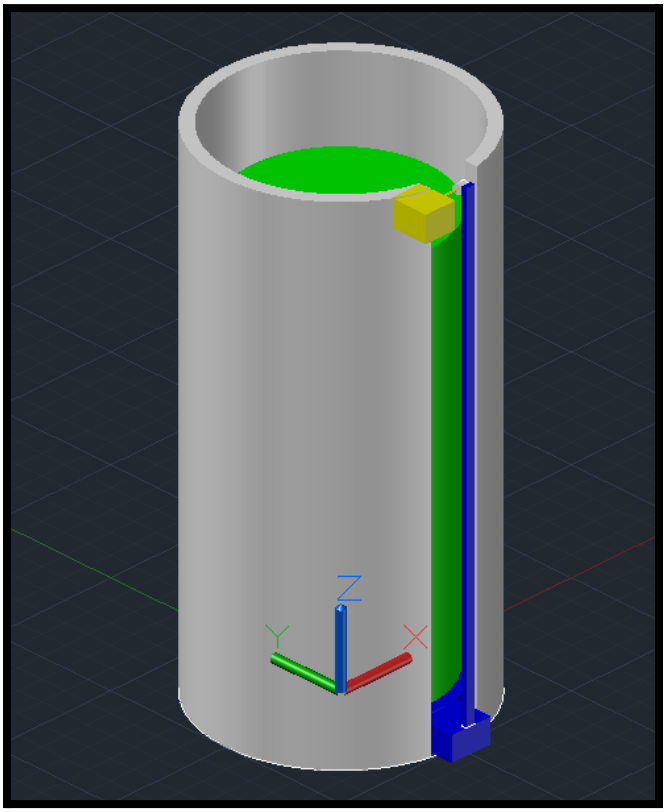



Figure 2: Overview of PVC tube with chips & chip platform

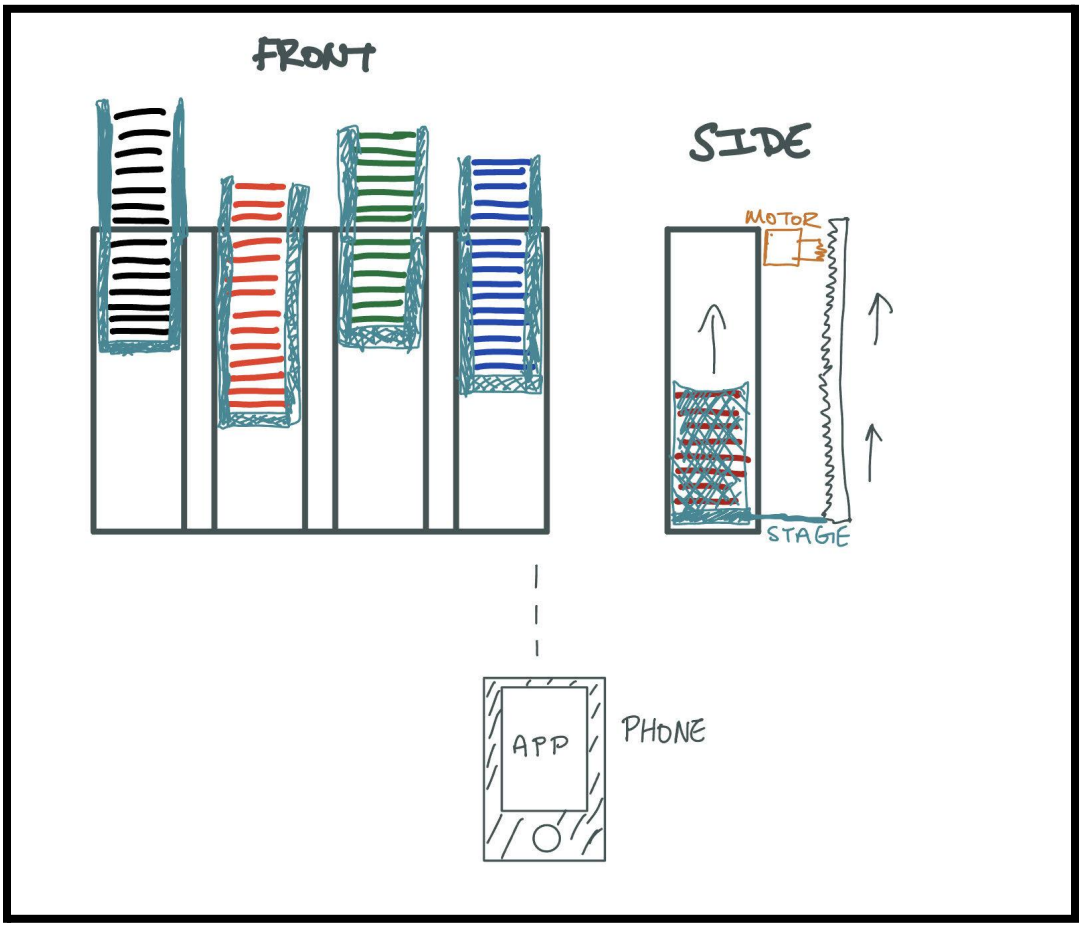
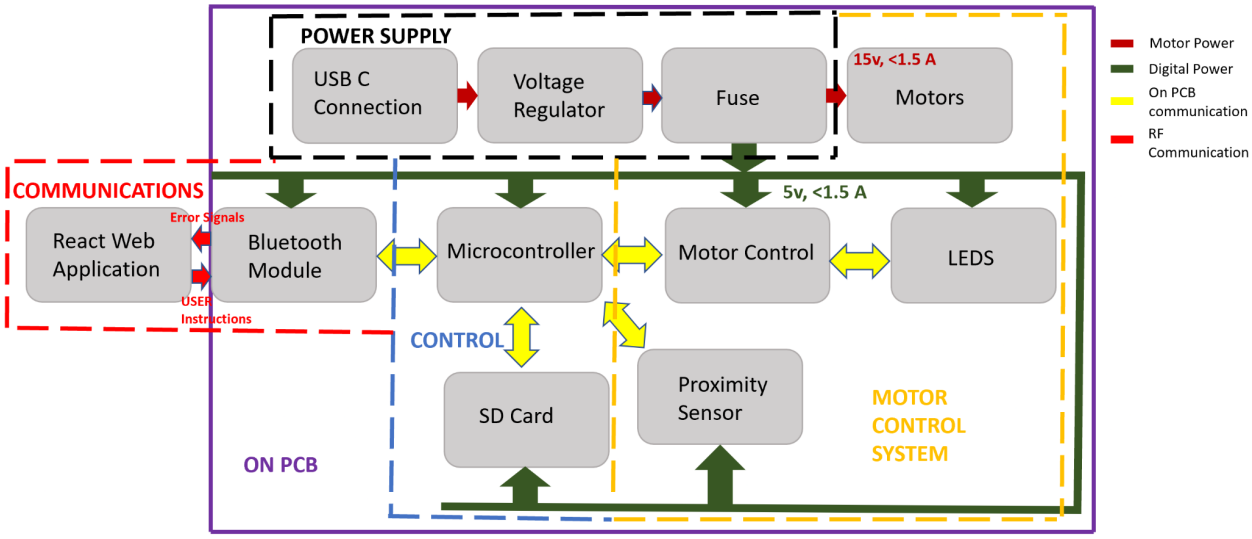



Figure 3: Poker Chip Counting Companion with Paired Phone App

# 1.3 High-Level Requirements List

- The device will have a capacity for at least 100 poker chips and will dispense them at a rate of 5 chips per second (+/- 0.5 seconds).
- A web-hosted application that can receive and relay information to the machine, with a speedy response time within $800ms \pm 160ms$.
- At the end of a game when the users have deposited their chips into the device, it will count their chips within 5 seconds.

# 2.1 Block Diagram




# 2.2 Subsystem overview

*Power Supply:*

Requirements: Provides Power from a USB-C connection. The proper voltages and currents needed for each other sub system will be given. Must source 15V +/- 1V input into our device with 1.5A current draw.

*Control:*

Requirements: A microprocessor and SD card will handle the information from the bluetooth module and bring the user input data to the motor controller system. The data from the bluetooth will be processed too quickly for the motor controller system to handle so a microcontroller is needed.

Tolerance Analysis: The microprocessor is able to perform operations at 9600 per second. This value should not change much, but there can be some more time delay between memory and the microprocessor, but this delay will be on the order of microseconds so synchronous read and write operations should be possible.

*Communications:*

Requirements: Bluetooth Connection [HiLetgo 2pcs HC-05 Wireless Bluetooth RF Transceiver Master Slave Integrated Bluetooth Module 6 Pin Wireless Serial Port Communication BT] takes the input data from the user and puts the user inputs into registers so

that the proper chips can be dispensed. This subsystem will also be used to send information back to the app to tell the user that the machine is done dispensing and to also communicate any errors that occurred.

Tolerance Analysis: To communicate all user data it will take around 200ms, it can take up to 200ms for the processor to handle the data and then another 400ms for the motor control to communicate with the motors leading to around 800ms delay with acceptable range of around 20%.

*Motor Control System:*

Requirements: A series of pvc pipes will be used to house the different color of chips, a platform will be placed at the bottom of the pipe to move the chips up and down. A gear system controlled by a stepper motor [Twotrees Nema17 Stepper Motor, 4 Lead Stepper Motor Nema] will move the chips in steps of one chip. This subsystem will take the information given by the user and convert it into a signal the linear actuator can understand.

Tolerance Analysis: The stepper motor is able to move 1.8° ∓ 5%, which will correspond to a fraction of the height of a poker chip. This will ensure that the motor has enough accuracy to raise the chips within a 1-chip height accuracy.

*User Web Application:*

Requirements: The user interface will come in the form of a web React application. We will be using Bluetooth as the way for the application to communicate with the Poker Chip Companion machine. There's a few ways users interact with the machine…
At the start of the game, the user will turn the companion on to its dispensing state, and can input the value of each chip, the amount of players, the small & big blind, and the buy-in (this will be preselected, however the user can alter is based on each player if needed). The application will take these values and input them into an algorithm to calculate how all the poker chips are divided, and the amount per player if buy-ins are different. This information will be sent to the companion.

At the end of the game, the user will turn the companion on to its collection state, and will be instructed to input the chips of each player one by one. As the user completes the input of one player, they will press a "Next Player" button (like a timer lap button) to signify to the machine the collection process of the next player. Once complete, the user presses a "End Collection" button, and will be presented with the complete scoreboard of player buyout.

Tolerance Analysis: Using a Web app being able to process the user input within 200ms.

# 3. Ethics and Safety

## Intentional Misuse - Network Hacking:

*Issue* - Individuals exploiting the web application's security to get additional chips. This poses a risk because someone could have access to more poker chips than what they had actually bought in for.

*Code of Ethics Breach* - Without accounting for this issue, we would be subject to breaking 1.3 of the ACM Code of Ethics that instructs computing professionals to "Be honest and trustworthy". Without prioritizing security, we run the risk of losing the values of honesty and trustworthiness in the game of poker.

*Solution* - We will add a passcode to the website so that a 'game master' can initiate and have oversight of the buy-ins for each player.

## Accidental Misuse - Child safety:

*Issue* - A child could accidentally place their hand inside the device and get their hand pinched by the motor and motor stage.

*Code of Ethics Breach* - With this issue, we are subject to breaking I.1 of the IEEE Code of Ethics that says "to hold paramount the safety, health, and welfare of the public…". We would also be subject to breaking 1.2 of the ACM Code of Ethics that instructs computing professionals to "Avoid harm" and not inflict physical or mental injury.

*Solution* - The device & housing will be safe and avoid pinch spots so that in the event of a child being near it, the device will not harm them.