

# UCF Senior Design I

## Automatic Smart Spice Turntable



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### **Group 10**

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# Project Narrative

Cooking is an art that humans beings have been partaking in for centuries, and with this storied history of this art comes a long history of the use of many different types of spices throughout history. Historically, different societies used the herbs, roots and fruit that were local to their territories, which helped to develop the great diversity of cuisines and flavors we see around the world.

The trading of spices around the world has occurred since antiquity, as they had a very high perceived value for use as medicine or for religious rituals. Nowadays, spices are mainly used for cooking, but their trade and availability is unprecedented. We now have access to hundreds of different kinds of kinds of seasoning to flavor our meals, making the possibilities for culinary creative expression innumerable. However, with all this variety comes a slight inconvenience: the organization of these spices.

Using the correct seasoning for a dish is imperative to the proper preparation of a well-crafted meal, but this becomes difficult when one's spice cabinet contains a great variety of spices. Some spice containers need to be placed behind or on top of another in order to fit some cabinets. Currently, there are small turntables, sometimes called Lazy Susans, that aid in this problem by placing the spices on a rotating platform, meaning that no spices will be hidden behind one another and all spices will then be in full view. Our project is to improve on this design by creating an automatic turntable for spices that rotates in such a way that the wanted spice will be rotated toward the user.

We propose a system consisting of motorized, two-tiered turntable with numbered slots for placing each spice and a mobile app used for initial setup and wireless control of the turntable. The user would first assign each slot in the app to a spice and place the spice in the corresponding slot on the turntable. After this initial setup process, the user would be able to select the spice on the app through interacting with the app's user interface or through voice commands. The turntable would then respond by turning itself so that the spice requested is directly on the front face of the device. Since the turntable will have two tiers which move together, each slot will have a small LED light next to it to indicate that the spice within has been selected.

Such a system would make flavorful cooking a much easier task, and it will bring a useful update to an organizational device that has not seen much innovation in decades.

# Specifications

- *Physical layout*
  - Have two levels of spices for a total of 16 spices, with 8 spice containers per level.
  - Turntable diameter of approximately a foot for both levels
  - Marking for each spice slot to match in-app turntable representation
  - Should be able to be carried by one person
- *Electrical features*
  - The turntable will be battery powered
  - LED's will surround every spice container, and will be able to light up the requested spice
  - Flash all LED's in the event a requested spice is not present in the turn table.
  - A memory device must be present on the turntable, so in the event of a disconnection from the app, a second set up isn't required.
- *Mechanical features*
  - Have a maximum speed that allows it to deliver a spice on the other end of the table in at most 5 seconds
  - Turntable must be able to withstand water splashes
  - Utilize a pouch to maintain the position of the spice while in motion
- *Mobile app*
  - App must be available for iOS and Android devices.
  - App must be able to perform set up and labeling of spices.
  - App must communicate wirelessly with the turntable.
  - UI representation of turntable on the app for initial setup and ease of use.
  - Through voice recognition, the app will be able to deliver a requested spice.
  - App will allow for reorganizing the spice after set up.
- *Miscellaneous*
  - Components must cost a total of \$500.
  - Will be colored a solid black color

# Project Timeline

Timeline				
Senior Design 1				
#	Name	Begin	End	Completed
1	Brainstorm Ideas	1/22/2020	1/29/2020	Yes
2	Divide and conquer 1.0	1/22/2020	1/30/2020	Yes
	<b>Research</b>			
3	Dimensions agreement	2/03/2020	2/07/2020	No
4	Portability	2/03/2020	2/07/2020	No
5	Holder material	2/10/2020	2/14/2020	No
6	Pouch material	2/10/2020	2/14/2020	No
7	LEDs	2/17/2020	2/19/2020	No
8	Motor discision	2/19/2020	2/26/2020	No
9	Circuit design	2/21/2020	2/28/2020	No
10	Power supply	2/28/2020	3/02/2020	No
11	Micro controller	2/28/2020	3/02/2020	No
12	Schematic	3/02/2020	3/06/2020	No
13	App Design	3/02/2020	3/07/2020	No
14	Communication layout	3/09/2020	3/13/2020	No
15	Voice recognition	3/09/2020	3/13/2020	No
16	Water	3/13/2020	3/16/2020	No

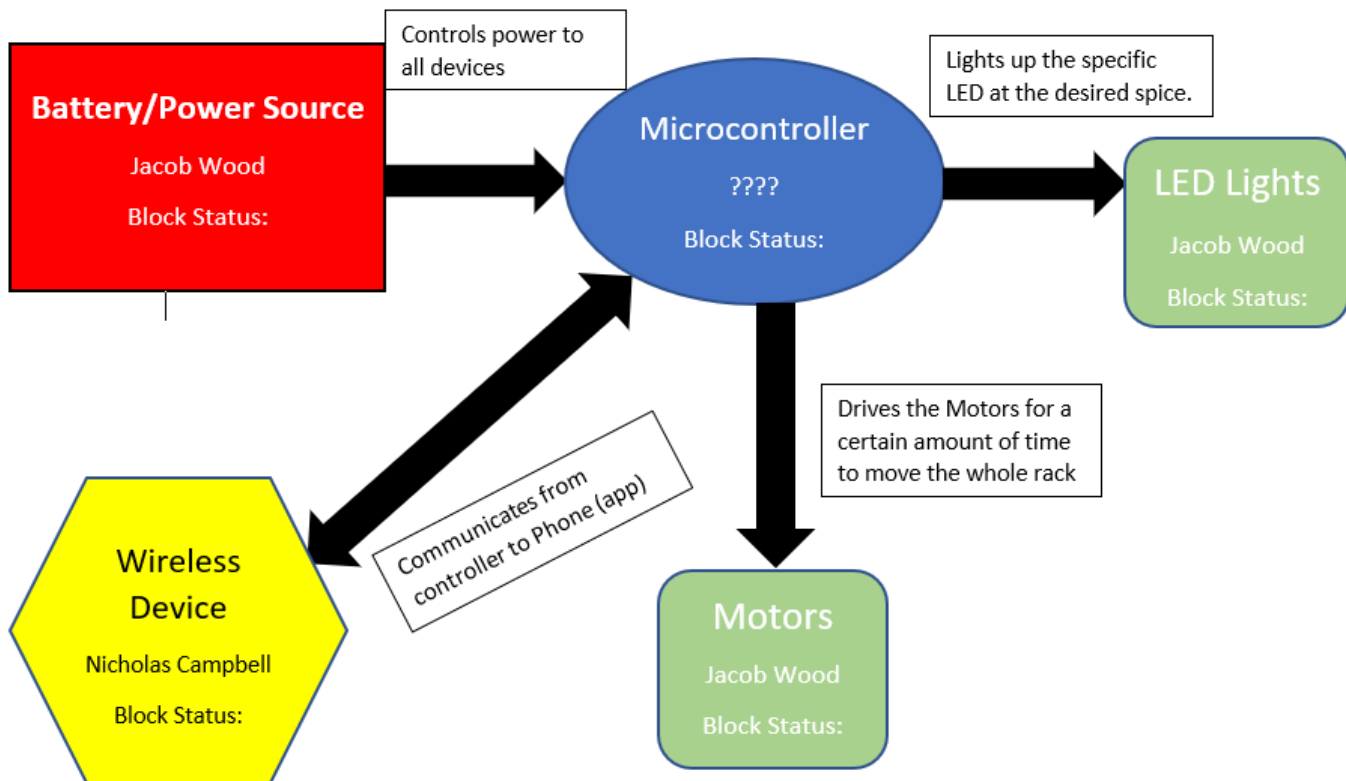
	resistance			
17	60 pg draft	2/03/2020	03/20/2020	No
18	60 pg Feedback meeting	3/24/2020	3/25/2020	No
19	Final Documentation	3/25/2020	4/21/2020	No
20	<u>Purchase and Test equipment</u>	4/21/2020	4/27/2020	No
<b>Senior Design 2</b>				
21	Create Prototype	TBD	TBD	No
22	Test and test	TBD	TBD	No
23	Final Modification	TBD	TBD	No
24	Peer Presentation	TBD	TBD	No
25	Final Report	TBD	TBD	No
26	Final Presentation	TBD	TBD	No

# Project Design

## Hardware

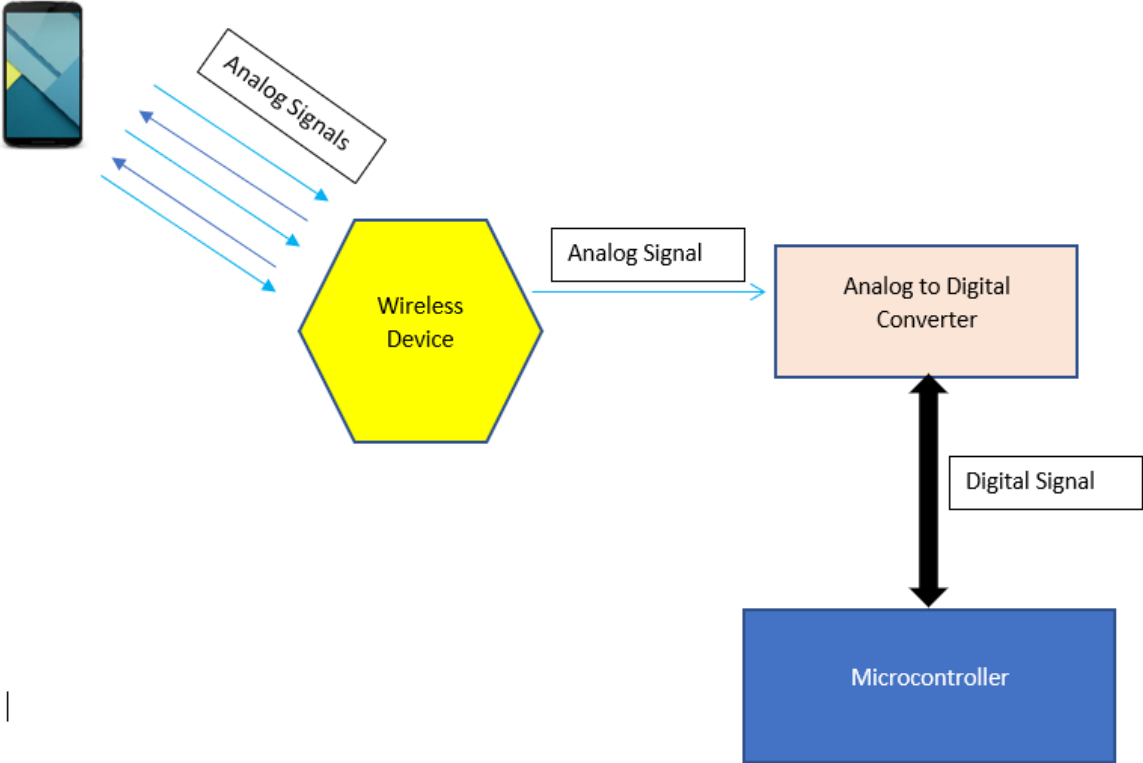
The main components of the hardware will be the battery, microcontroller, wireless device, motors, and LED lights. The battery will be connected to the microcontroller in order to control the motors and the LED lights. The motors will turn the turntable to a given position based on the spice selection from the user. The LED light would show the exact location of the spice that the user is looking for. The wireless device will communicate with the app and the microcontroller driving the motors to spin for a certain amount of time and turn the LED light at the location of the desired spice.

This system requires various digital and analog converters and devices to communicate between the microcontroller and the wireless device because the signal from the phone to the wireless device would be analog while the signal from the wireless device to the microcontroller will be digital. Along with various amplifiers and dividers depending on the capacity of the power source, the weight of the spice rack, and the power of the motors.



# Analog to Digital Communication

Using an analog to digital converter (ADC) to communicate between the microcontroller and the user's phone will allow for wireless control of the turntable through the mobile app. The wireless device will receive the analog signal from the phone and pass through the ADC to the microcontroller, giving the signal for the motor to spin and for which of the LED lights to turn on.



# Project Budget

Part	Quantity	Cost	Total cost
Motor	1	\$30	\$30
Battery pack	1	\$10	\$10
Wireless receiver	1	\$10	\$10
ADC	1	\$8	\$8
Microcontroller	1	\$20	\$20
Plywood	10 ft <sup>2</sup>	\$5	\$15
Misc. building material	TBD	\$60	\$60
PCB	1	\$15	\$15
Total			\$168