Automated Spice Mixer

Group S9
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Intro

Four technical aspects of the Automated Spice Mixer project are introduced:

- General computing and controllers

- Mechanical layout of storage

- Weighing and vibration configuration

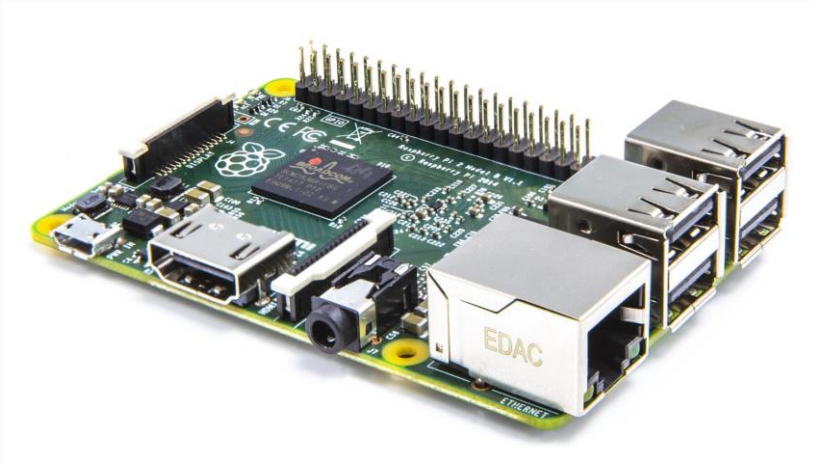- User Interface guidelines

Computing

Distributed system of computers.

Raspberry Pi as central computer with Linux, interacting with user and network.

Multiple microcontrollers to offload control and sensor logic and maintain real time constraints.

Controllers will decouple carousel from containers, allowing separate development and test.

Raspberry Pi

Strong Processor and Operating System Services (networking, GUI, display, GPU).

Low pin count, limited device protocol support (SPI, I2C, CAN), low compute reliability.

Good for central brain to command specialized controllers.

Specialized Controllers

Specialized microcontrollers are cheaper, more efficient, and have more hardware support for pins.

Will be running simple control/sensor loop with state controlled by Pi.

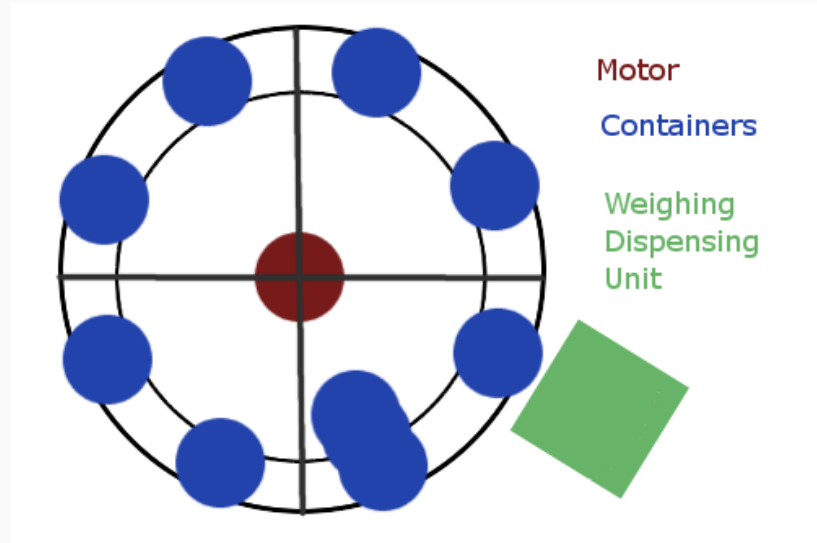May be embedded into the device packaging.
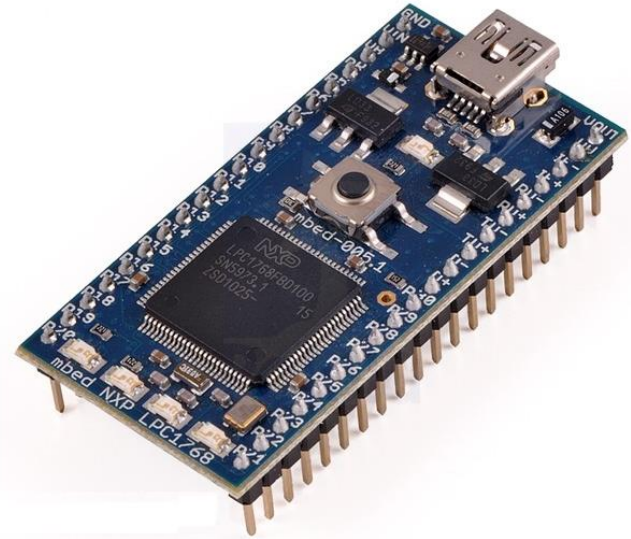
Mechanical Layout

Horizontal Carousel

Rails to stabilize containers

Containers lifted off rails for weighing and dispensing

Shaking/Vibrating Unit implemented with Dispensing unit

Motor

Containers

Weighing Dispensing Unit

Motor Choice

Current Choice: Stepper Motor, 125 oz.in

Unipolar or Bipolar

Step Angle: 1.8 degrees (precise enough)

Available with more torque if needed
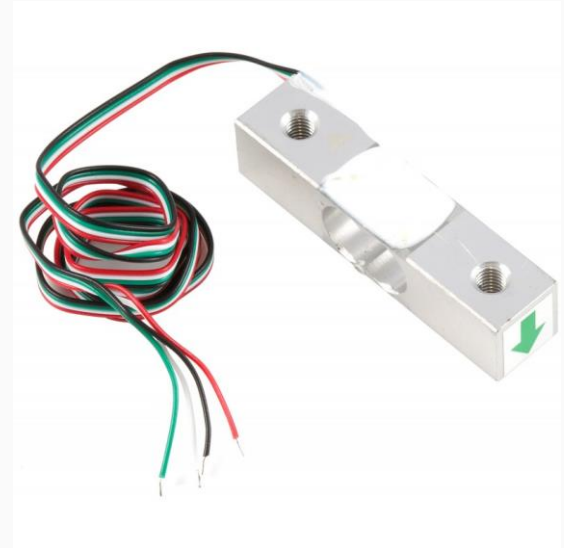
Weighing Mechanism

Micro load cell as the main component for weighing each container.

Micro load cell has 5 kg load limit

Resolution of 0.05%.

+/- 2.5 grams

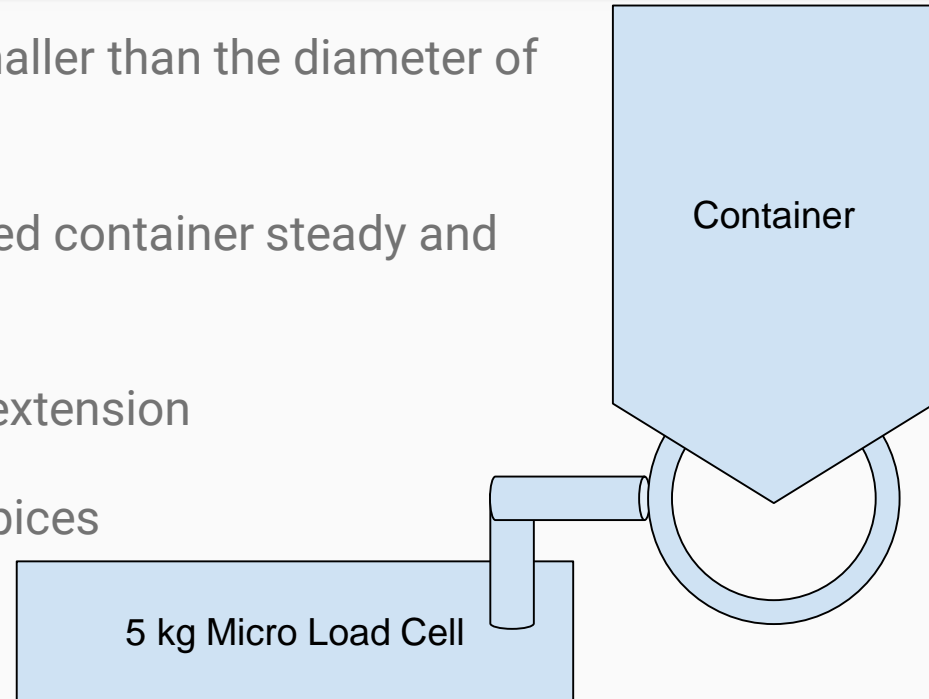The weight will be displayed on the LCD touchscreen

Mechanism Diagram

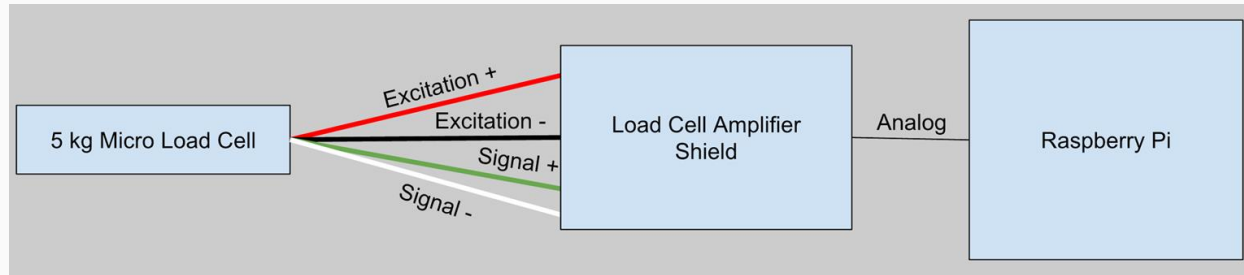Attached to the micro load cell is a ring smaller than the diameter of the container

The ring will be able to hold the cone shaped container steady and take an accurate measurement

The load cell has a hole to mount the ring extension

The ring will vibrate to help dispense the spices

Container

5 kg Micro Load Cell

Connection Diagram

Micro load cell is connected to a load cell amplifier via four wires

The load cell amplifier is then connected via Analog to the Raspberry Pi

User Interface Design Principles

Touchscreen LCD 7" will be used to display GUI.

Employ User Interface Design Principles

   1. The Gestalt Principles

      Ensure that the design is **intuitive**

   2. Don Norman's Design Principles

      Ensure that the design is **user-friendly**

User Interface Design (Gestalt)

1. Proximity

   Buttons are placed to provide visual context

1. Similarity

   Consistent fonts and styling for different context (Menu capitalized etc.)

1. Common Fate

   Neat alignment of object in grid format

User Interface Design (Norman)

Two important will be focused on.

1. Feedback

    Show user relevant information after he/she executes the task.

1. Affordance

    User should intuitively know "how to use" the interface.

Other concepts such as Visibility, Constraints, Mapping, Consistency will also be adhered to but not as strictly.

Questions?