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Customer Background

Company: Honda
Sponsors: Zach McCurdy & Charles Messmore
Industry: Automotive

Problem Statement / Scope of Work

Problem Statement: Honda has an issue within their automated brazing department where the wire fed into the robotic arm tends to kink.

Scope of Work: We plan to deliver a finished prototype that will detect when a kink occurs and cut the wire while allowing enough wire to finish the current car.

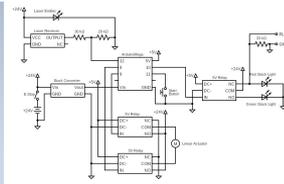
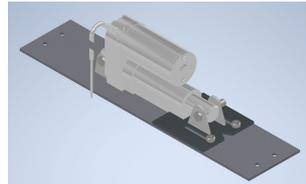
Requirements

- Detection of Wire Kink
- Leave Enough Wire to Finish Current Vehicles
- Stays Within the Original Parameters of the Housing

Concept Exploration

- Rotate Barrel
 - Solves Root Issue
- Conductive Tube
 - Wire Hits Metal Tube Completing Circuit
- Computer Vision
 - Cameras "See" The Kink
- Strain Gauge
 - Gauge Detects Pull Force of Wire

Final Design



FMEA

- Structural Analysis
- Function Analysis
- Failure Analysis
- Risk Analysis
- Optimization

Testing

Test ID	Test Name	Test Description	Test Requirement
1	Photo Sensors and Data Cables	Connected sensors to data cables to a multimeter to ensure that the sensors are reading one another	If a broken signal is detected then it passes, if a broken signal is not detected then it fails
2	Power Source	Connected to multimeter to check for a desired 24V output	If the multimeter reads 24V ±5% then it passes if not then it doesn't pass
3	Stack Light	Individually tested each LED by connecting to power and using a switch	If the lights were not illuminated then it fails, but if they light up then it passes
4	Relays	Connected to 5 volt rails on a breadboard and used a multimeter	If we are able to switch the connection using 5V rails on a breadboard it passes.
5	Linear Actuator	Connected to switches connected to the power supply to ensure actuation	If the actuator extends fully and retracts on its own it passes, if it doesn't extend, retract, or retract
6	Code	Wire up all the components and run the code and see if the components interact with one another in the desired manner	If the code arms after PB is pressed, turns on the lights, actuator, and stops the actuator after the cut it passes. If not it fails.
7	Arduino	Tested for power and power delivery	If the arduino is able to properly regulate 5V power and execute the code it passes.



HONDA