Encoder Automation Table

Showcasing the power of encoders.

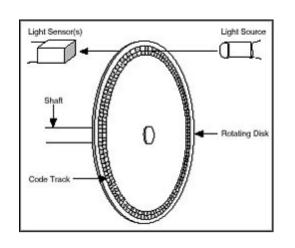
360 Designs

Jake Metter, Mark Jennings, Tanner Sloan

Sponsor:



What's an encoder?







Encoders are extremely accurate angle measurement devices that can easily translate to distance, velocity, and acceleration.

Encoders in Action



Printing



Equipment



Food & Beverage

Project Objective

- → Design and create an attractive, interactive display that educates individuals on EPC's lineup of products.
- → Demonstrate the programmable encoder's functionality.
- → Demonstrate the linear encoder's functionality.
- → Demonstrate an industry application ("cut to length")

Value Proposition

- → The Encoder Automation Table will:
 - Showcase functionality of EPC's products
 - Attract individuals at tradeshows
 - Inform the public
 - Train new employees

... Thereby increasing company income and efficiency

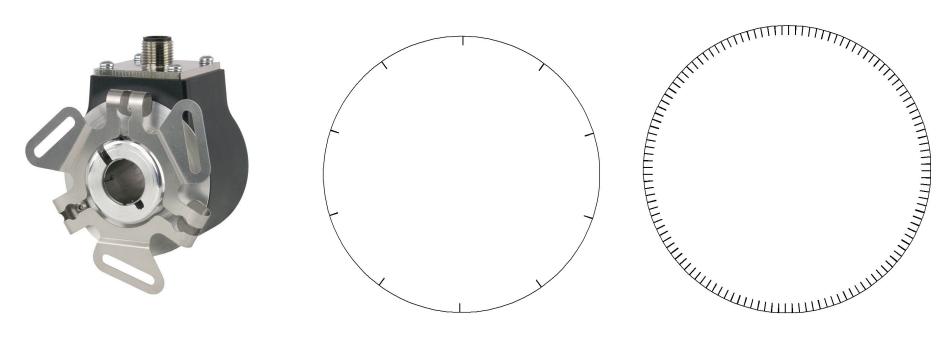
User Experience

- 1. User engages in either Citizen or Engineer mode, within the HMI.
- 2. User attempts to actuate the block to a specified distance.
 - a. Success/failure is determined based on the degree of accuracy.
 - b. In citizen mode, the options for the programmable encoder will be pre-determined.
 - c. In "Engineer mode" the user will get to manually change the resolution of the programmable encoder in order to achieve the goal.
- 3. Upon failure, the block returns home and the user may try again.
- 4. Upon success, the user will experience a "random success routine"
 - a. Candy dispensed
 - b. Flashing lights
 - c. Music or sound is played

Programmable Encoder Features

- → Resolution
 - ◆ The Model 25 SP can be programmed to have a specific resolution
 - Resolution is the number of ticks/points that the encoder counts per resolution
 - Capable of the range of 1 and 65,536

Model 58TP Programmable Encoder



Lower Resolution (8)

Higher Resolution (128)

Project Learning

- → Synthesizing budgets and purchasing
- → Organizing multi-disciplinary tasks to provide synergy
- → 3D modeling, rendering, and animation to effectively communicate design plans
- → Learning a new language to program the Unitronics display
- → Working with the client as demands and ideas morph

Unresolved Issues

- → Reduced project scope
- → Anodization timeline (correlates to downtime)
- → Professional appearance (hiding wires, component housing)
- → Linear actuator returning "home" after each cycle
- → Difficulty getting the PLC/HMI to work with encoders and motors

Plan for the Future

→ March

- Anodizing plate
- Purchase housing(s) for wiring, relay, driver and HMI
- Test food dispensers and motors, purchase additional hardware (if needed).
- Begin programming user experience inerface on the HMI/PLC

→ April

- Visit client to present prototype
- Finish programming and installation

→ May

Design Expo - Final Prototype

How will the motion be controlled?





Unitronics HMI+PLC Unistream 10.4 Multitouch 32 bit processor
Digital and analog input/output modules

Capstone Project Budget

Project: 360 Designs
Last Updated 2/26/2020

Expense Items	Vendor	Date Puchased	Year								Item			
			Sept	0ct	Nov	Dec	Jan	Feb	Mar	Apr	Total			
Equipment/Tools:												- 2		
Stepper Motor	Automation Technology INC	2/5/2020		2				\$ 212			\$ 21	2		
Travel:	*									1				
Travel Expenses		2/26/2020	- 1	e e	17			\$ 260			\$ 26	0		
Annodizing Expenses	Deming Industries	2/26/2020	V:	30				\$ 75			\$ 7	5		
General Expenses	Univerty of Idaho	2/26/2020		Y.	15			\$ 160			\$ 16	0		
Supplies / Parts / Services:			10	-	ñ	ř	1	î		+				
linear actuator	Amazon	10/27/2019	*	5 177						1	\$ 17	7		
stepper motors	Amazon	10/27/2019	- 8	5 44							5 4			
brackets	Amazon	10/27/2019		\$ 11							\$ 1			
speaker	Amazon	11/18/2019			\$ 17						\$ 1	7		
food dispenser	Amazon	11/18/2019			\$ 16						\$ 1	6		
		5 55 53									5 -			
		3	- 1	56							\$ -			
		4		22						3	\$ -			
	18		i i	~	-		-			+	\$ -	S		Expense
Shop Usage (est. Hrs):	· · · · · · · · · · · · · · · · · · ·			4							Hours	,	312	Jubtuca
shop expenses	University of Idaho	2/26/2020	1	1				500			500	<u> </u>		
		3	į	8							0			
Tax Expenses	*		-	-			1			-	0			
Purchase from 10/27/201	19	5	- 1	14	-						14			
Purchase from 11/18/2019	19		T .	2	1					7	2			
Total Hall Control		3	1	8										
	+	×		-						-	0			

Graduate Student Support \$ 1,034 including fringe Shop Overhead \$ -

University Overhead \$ 100 5% of all expenses

Totals

\$ 2,106 \$ 4,000 \$ 1,894

Budget Excess