

EGR 314 Spring 2025: Embedded System Design Project II Noah Brent, Evan Skinner, Hunter Hassebroek, Kirk Volin

Team Rolles

Noah: Actuators

• Electromagnetic Coils and Drivers to Provide Acceleration

Evan: Sensors

• Four IR Sensor Pairs used to Determine Ball Position and Coordinate Actuator Timing

Hunter: HMI

- LCD Screen to Display System Information
- Buttons to Allow User Control

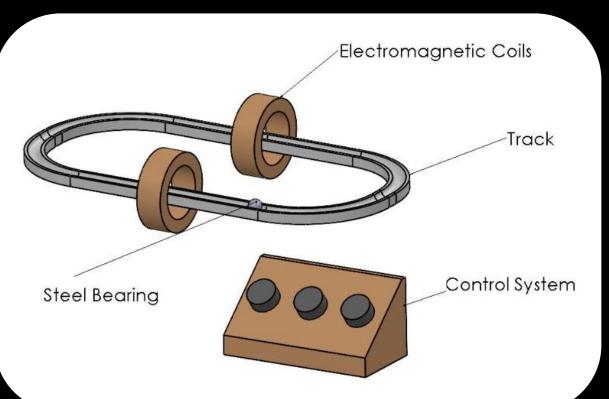
Kirk: MQTT

- ESP32 Communicates with MQTT Interface
- Allows User to Reset System over MQTT

PROTOTYPING

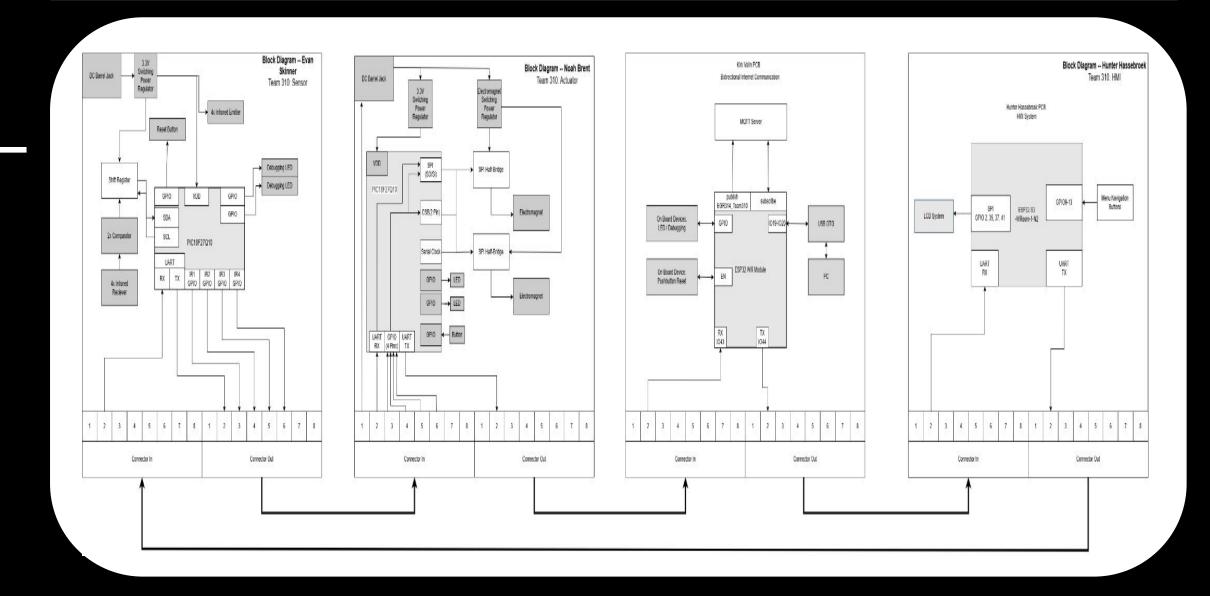
The goal of Team 310's exhibit is to demonstrate the STEM principle of Magnetism. This will be accomplished via a quick, interactive experience in order to allow a large number of participants while giving them some level of comprehension regarding the principle of magnetic acceleration.

Our team hopes to convey how this principle applies to the exhibits around it and the larger STEM field.

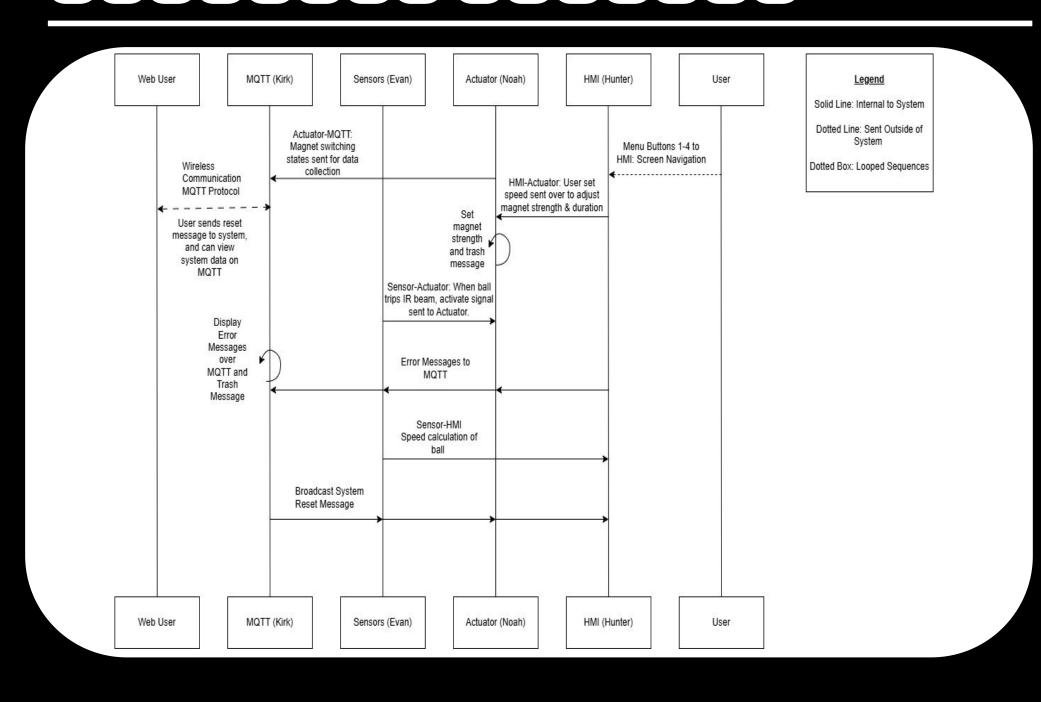


The initial concept sketch includes two coils which activate when IR sensors are triggered on either side of the each coil. The system has a control box which allows for inputs (speed and direction) as well as to display data.

TEAMBLOCKDIAGRAM



SEQUENCE DIAGRAM



messaging types

Message Type (Byte 1-2 uint16_t)	System Send From & Message Description (Bytes 2-55 uint8_t)
1	Broadcast: Master Reset
2	Sensor: Ball Speed
3	Sensor: Sensor Error
4	Actuator: Magnet Switchings
5	Actuator: Error
6	MQTT: Wifi Connection
7	MQTT: Reset
8	MQTT: Error
9	HMI: Send Data
10	HMI: Error

