DESCRIPTION

Training systems to assist athletes in practice are becoming more and more popular on the market. However, most of these systems are overpriced and inefficient. The goal of this project was to design a prototype of a volleyball training system that could run autonomously. This is beneficial because it allows the user to practice on their own time or it allows the coach to focus on the athlete and not worry about tossing or serving the ball. Because this is a prototype, the system will launch ping pong balls in place of volleyballs. Desired features include:

- User interface
- Practice options
- Change in angles & speeds
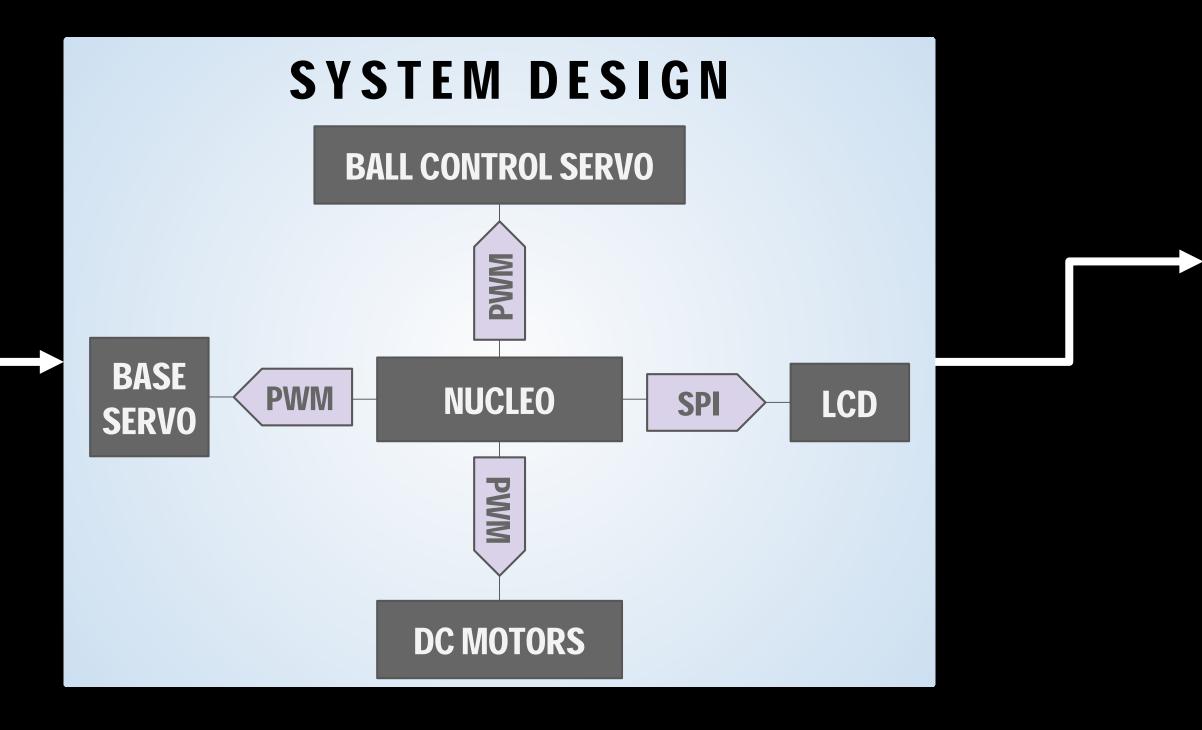- Wireless with easy chargeability

RESULTS

Project satisfies all minimum requirements: user interface with practice options, can change speed and angle, and holds up to 10 ping pong balls. The final project is pictured below.

HARDWARE

Microcontroller
- ARM Cortex M4 Nucleo Board

LCD
- Backpack used to reduce number of pins linked to Nucleo

DC Motors
- Quadruple half-H driver used to provide drive current
- Voltage regulator used to drop to 3V

DESIGN

Structure
- PVC piping used as vessel and track for the balls
  - attached to lazy susan to assist the servo in changing the direction of the launch
- Project incased by wood

User Interface
- RGB LCD display used for clear and visually appealing instructions
- Two switch buttons positioned below LCD to select options

Launch
- Balls roll into wheels attached to DC motors on either side of PVC
- Micro servo controls ball release

SYSTEM DESIGN

BALL CONTROL SERVO — PWM

BASE SERVO — PWM — NUCLEO — SPI — LCD

NUCLEO — PWM — DC MOTORS

SOFTWARE

Project was programmed in C using Keil.

LCD
- Initialized via SPI
- Serial communication used to write to the screen

DC Motors
- PWM signal sent to both motors

Servo Motors
- PWM signal sent to motors to control ball release and base rotation