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Project Title: Programmable Toy Car

This project features a programmable toy car that executes a user-defined sequence of cardinal directions. In its default "reading mode," users input a sequence (currently limited to ten moves) via four directional buttons. The car transitions to "driving mode" once the "GO" button is pressed or the sequence limit is reached. To ensure safety, an onboard ultrasonic sensor provides automatic collision avoidance, while adjustable speed and steering parameters remain under development. The outer shell will likely be made out of legos.

The system utilizes a Master-Slave architecture involving four Arduinos (AM, A1, A2, and A3) communicating via serial protocols. The Master (AM) processes user input from A3 and coordinates movement commands to A1 (rear-wheel drive) and A2 (front-wheel steering). The eight device types used by this project are as follows: (1) Stepper Motor, (2) Servo Motors, (5) Push Buttons, (1) Potentiometer, (1) LCD display, (1) LED, (1) Buzzer, and (1) Ultrasonic Sensor. The Stepper Motor will be connected to A₂ to turn the front wheels and steer the car. The Servo Motor will be connected to A₁ to spin the back wheels and move the car. Five Push buttons are connected to A₃ and represent the cardinal directions forward, backward, left and right, and a GO button to execute the path. The Potentiometer could possibly be for adjusting the speed or

steering of the car. The LCD is connected to A_3 , and it will display the current mode the toy car is in and the path that the user has written so far (ex. 'ULRUD'). The LED is connected to A_M and turns on when the car enters drive mode. The Buzzer is connected to A_M and will sound off when the car senses it's about to collide head-on with an obstacle. The Ultrasonic sensor is connected to A_M to know if the toy car is about to collide head-on with an obstacle.

This project comprises original work, as the system architecture and multi-Arduino integration resulted from our group's collaboration rather than copying external sources. Other unique elements such as the programmable path and controller module being on device rather than in the form of a remote control sending live data proves that our project has original work.