

1 Concepts Generated

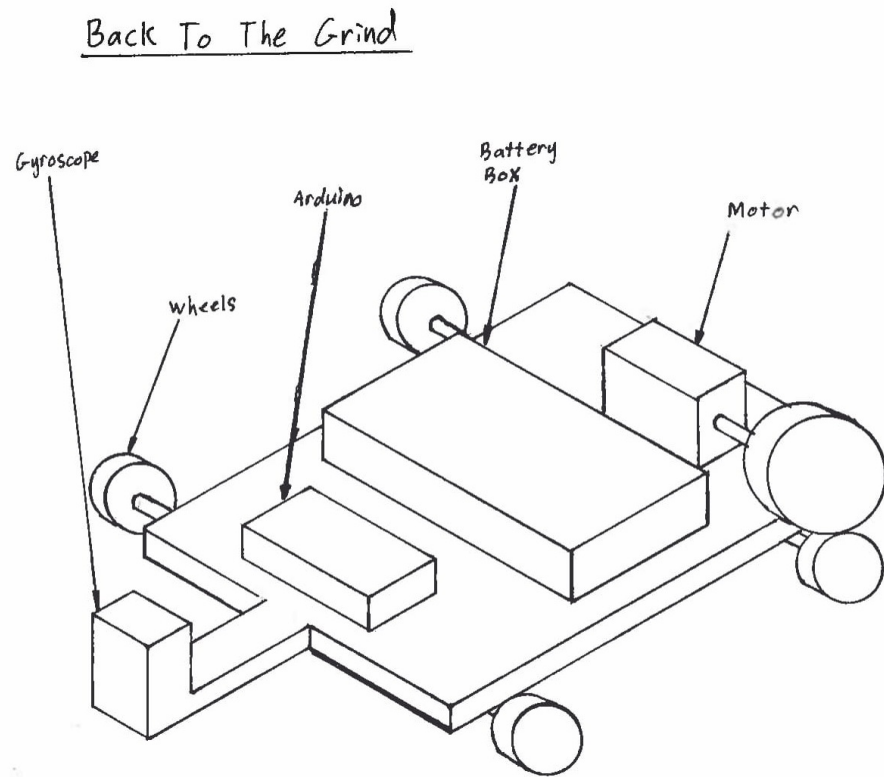


Figure 1: Back to the Grind Concept Sketch

Description: Back to the Grind is a friction drive locomotive; as the motor directly transmits power to the rim of the back wheel. The gyroscope reads the position and signals the Arduino when entering a turn; the motor then reverses, which causes the vehicle to brake.

Bless You

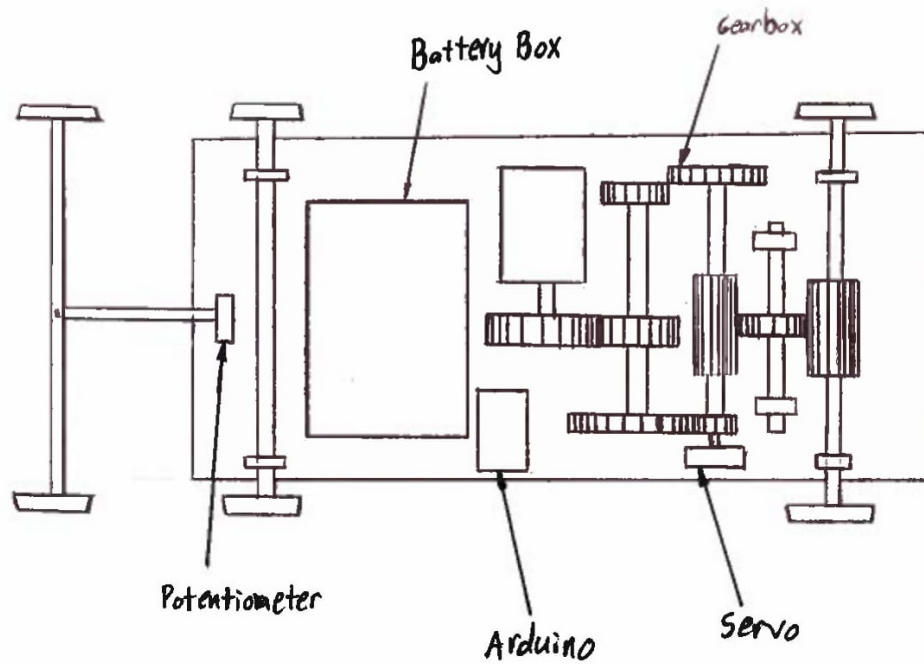


Figure 2: Bless You Concept Sketch

Description: A design which uses a gearbox to control speed. Wheels in front of the vehicle turn a potentiometer to detect turns. When a turn is detected the Arduino will signal the motor to run in reverse. Conical wheels will help with cornering.

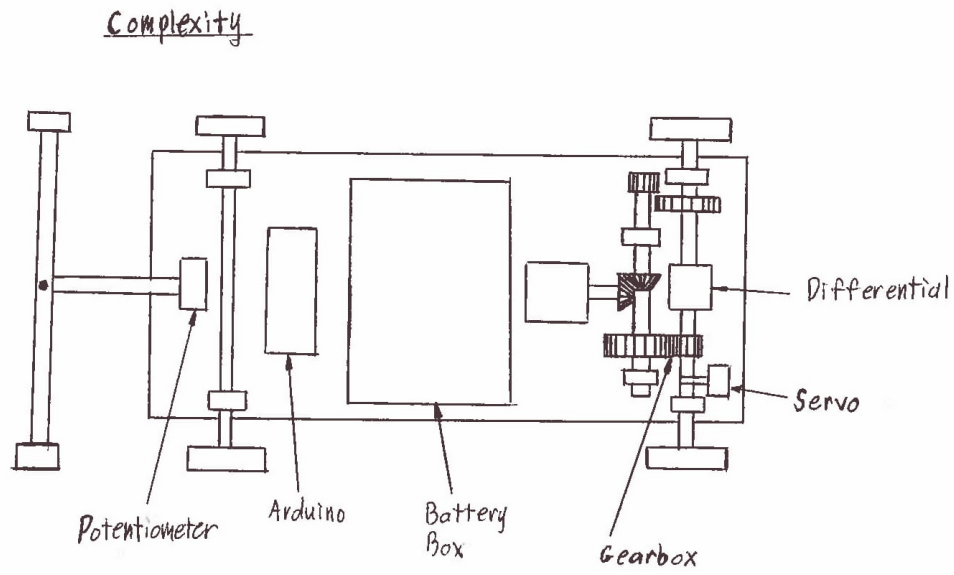


Figure 3: Complexity Concept Sketch

Description: A design using a variable gearbox with dual speed and a differential to enable smoother turning. Complexity uses a potentiometer on forward wheels in order to detect turns and slow down.

Get Hitched

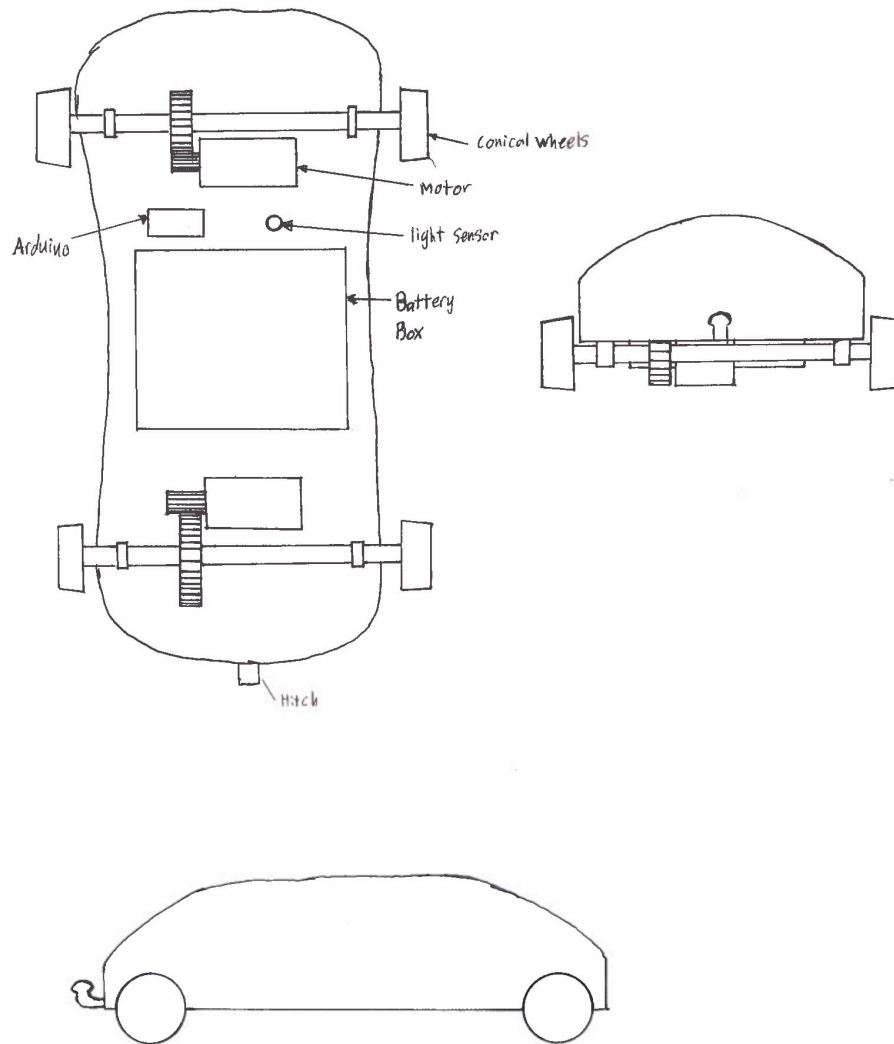


Figure 4: Complexity Concept Sketch

Description: Get Hitched is a four wheel drive vehicle powered by two DC motors. The design involves conical wheels for cornering and a light sensor that counts the rails in order to detect turns.

Propulsion Driven Locomotive

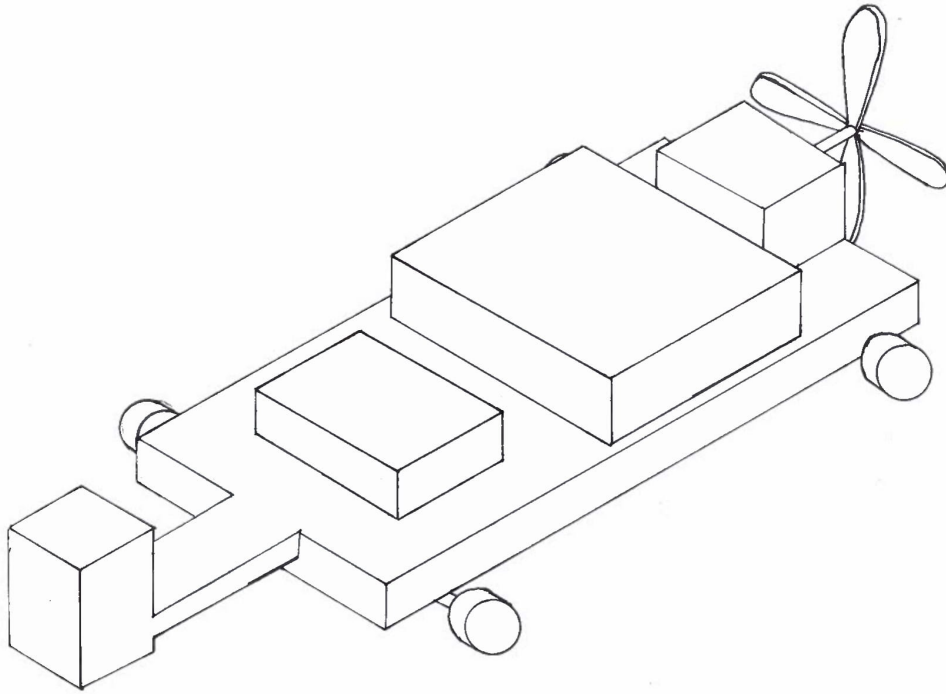
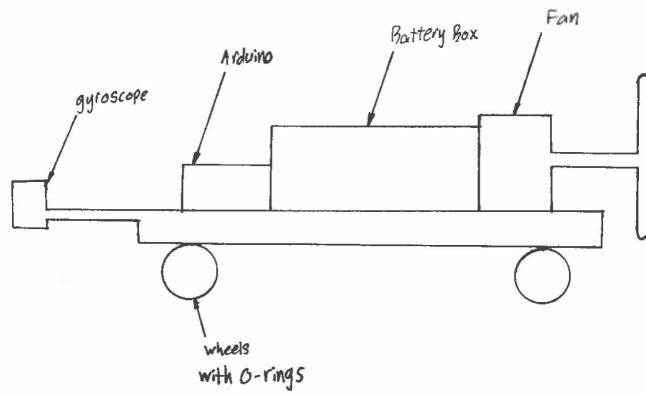


Figure 5: Propulsion Driven Locomotive Concept Sketch

Description: The motor directly powers a fan that propels the locomotive. The gyroscope coupled with the Arduino detect turns and lower the voltage on the fan to slow down. The wheels in this design use o-rings in grooves to increase traction.

Pump Chump

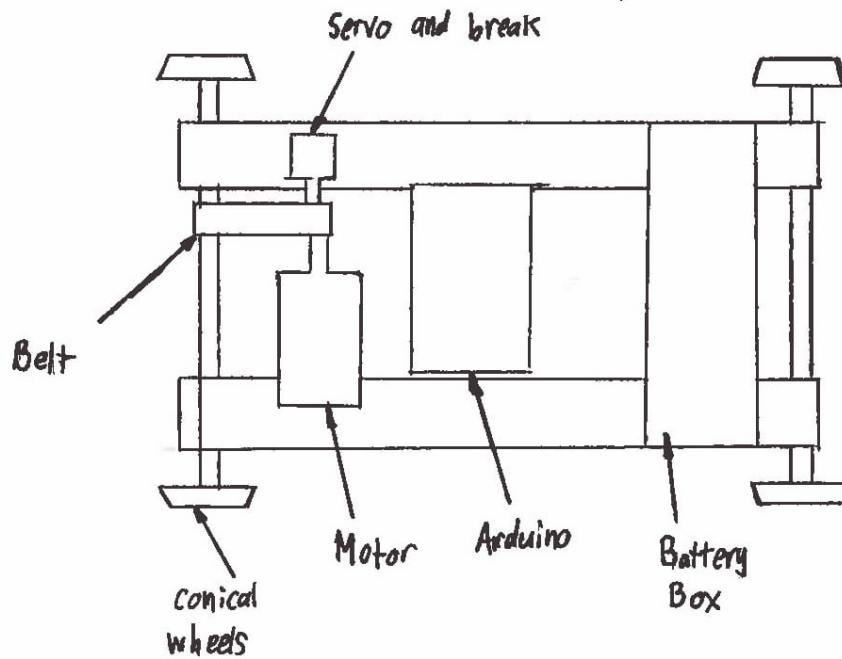


Figure 6: Pump Chump Concept Sketch

Description: Pump Chump uses a belt drive for propulsion and brakes to control speed. The Arduino is pre-programmed with track data and controls the motor and brakes. This design uses conical wheels for cornering.

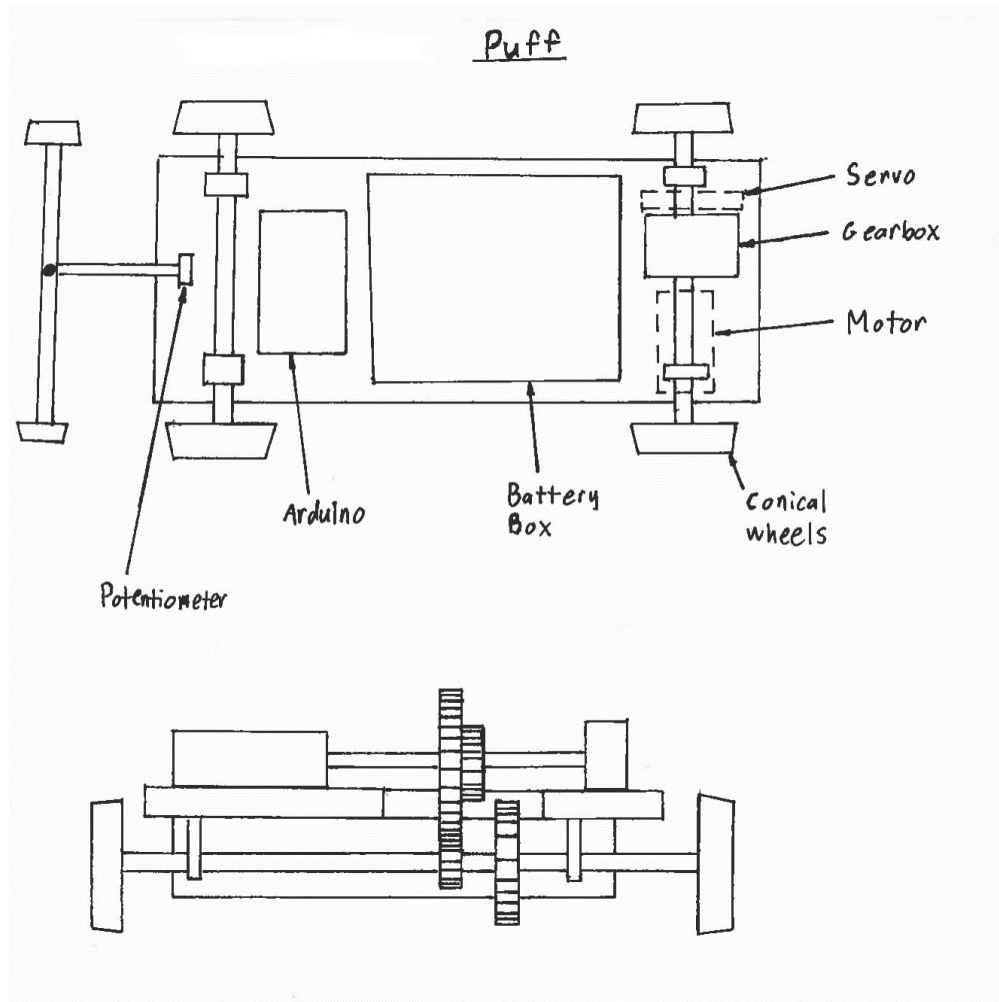


Figure 7: Puff Concept Sketch

Description: Puff is a rear drive locomotive with a dual speed gearbox and conical wheels. The servo switches the gears, rendering this design an automatic gear shift mechanism. Puff also involves a potentiometer that senses turns on the front wheels and transmits a signal to the arduino in order to slow down.

Tanky Train

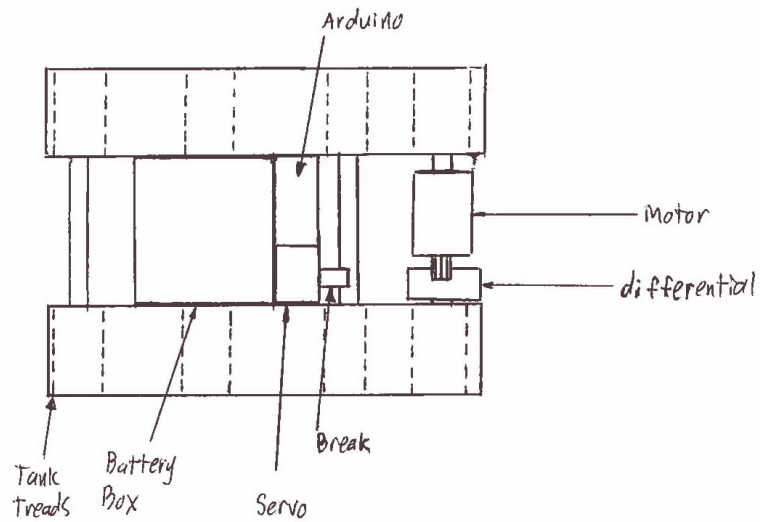


Figure 8: Tanky Train Concept Sketch

Description: The motor directly drives the treads on the wheels. A differential is used to give the vehicle better cornering. A drum brake will decelerate the vehicle before turns.

Too Many Gears

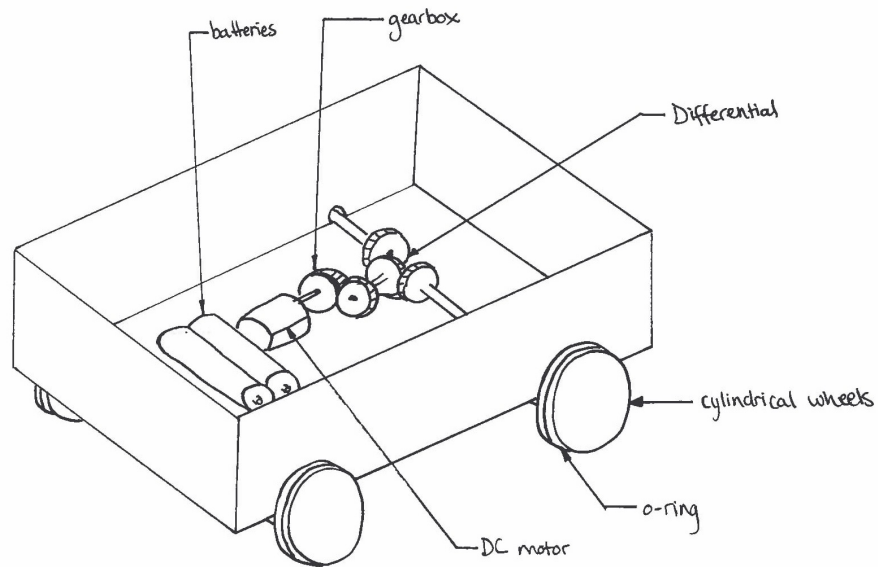


Figure 9: Too Many Gears Concept Sketch

Description: Too Many Gears involves multiple gears to step down the speed. The wheels have an o-ring to improve traction on a cylindrical surface. This design also involves a slip differential to enable easier turning.

THE DESIGN & CYCLER

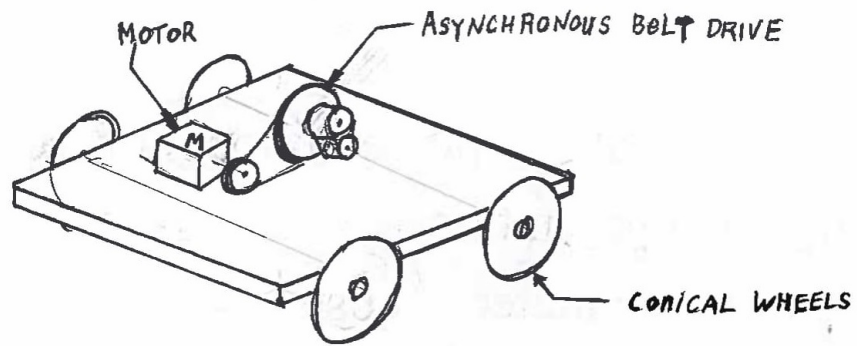


Figure 10: The Design Cycler Concept Sketch

Description: The Design Cycler involves a multiple asynchronous belt drive mechanism that reduces the speed. The motor is directly connected to the batteries and is controlled by a single switch, making this vehicle single speed. Conical wheels enable smoother turning and better control.

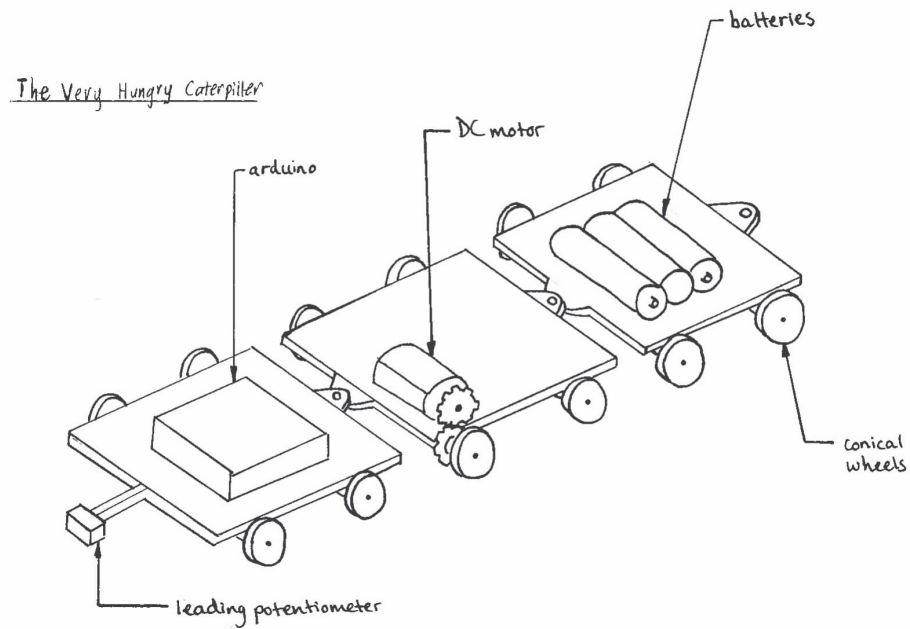


Figure 11: The Very Hungry Caterpillar Concept Sketch

Description: The Very Hungry Caterpillar (TVHC) is a multiple car locomotive design. Each car supports a different component; and the middle cart is directly driven by the DC motor. This design involves a potentiometer coupled with an arduino to detect turns and slow down.

Simplicity

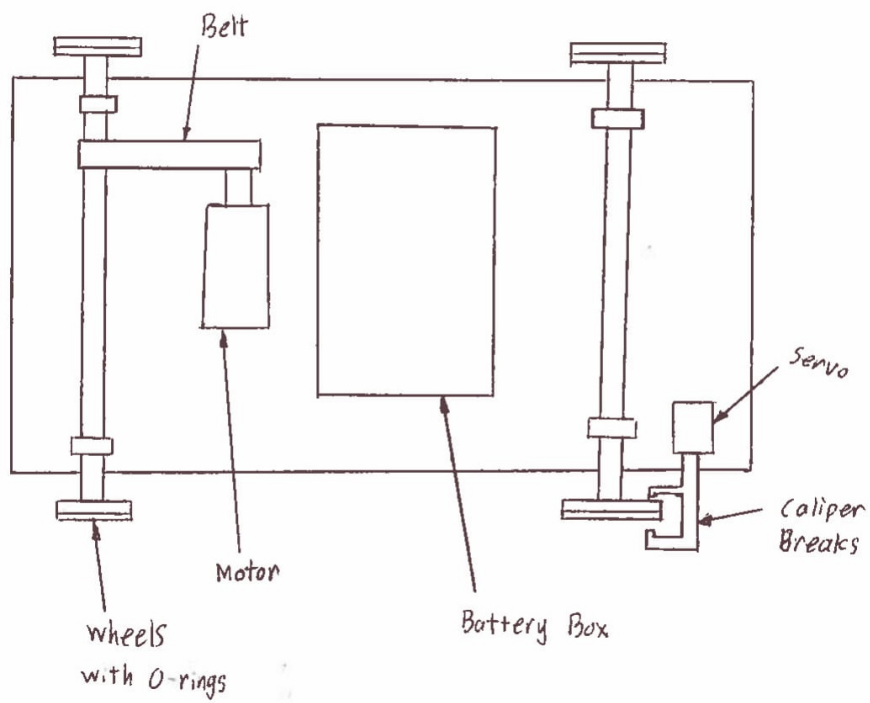


Figure 12: Simplicity Concept Sketch

Description: Simplicity has relatively few components. It uses a belt drive system and caliper brakes to control speed. Wheels with o-rings allow for better cornering.

Complex Bless you

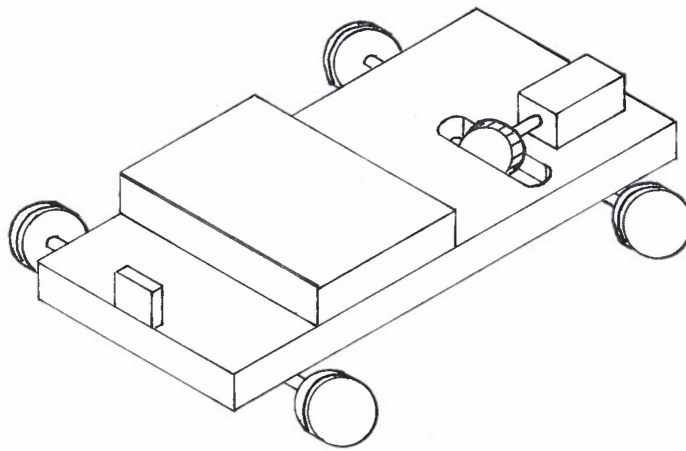
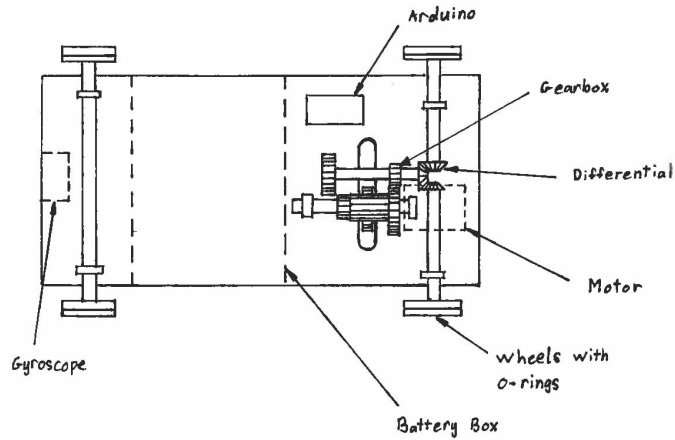


Figure 13: Complex Bless You

Description: After noticing the similarity between multiple concepts, we combined them into a single, improved design. Complex bless you is a combination of the above designs Complexity (Figure B3), Too Many Gears (Figure B9) and Bless You (Figure B2). This design features a gyroscope to detect turns and an arduino to control the speed in the gearbox. Wheels with o-rings and a slip differential allow for smooth turning. The gearbox is dual speed and can be controlled by the arduino through the servo.