Institution of MECHANICAL ENGINEERS

Team 12 Linear Drive

UCL

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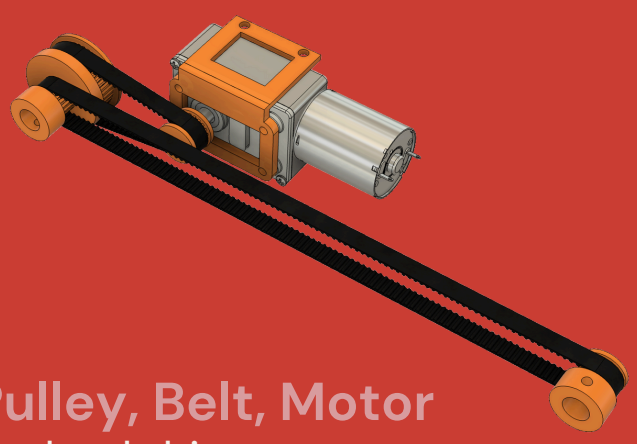
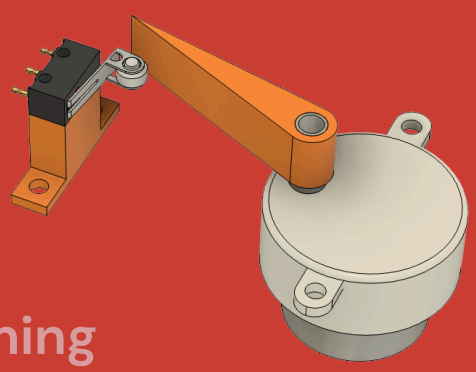
Competition Requirements

- **Automated device** that can successfully dock with a charging port.
- Must **engage, complete charging**, and return autonomously within 3 minutes.
- **Constraints:** No microcontrollers, size limit **400×400×400 mm**, and **£50 budget**



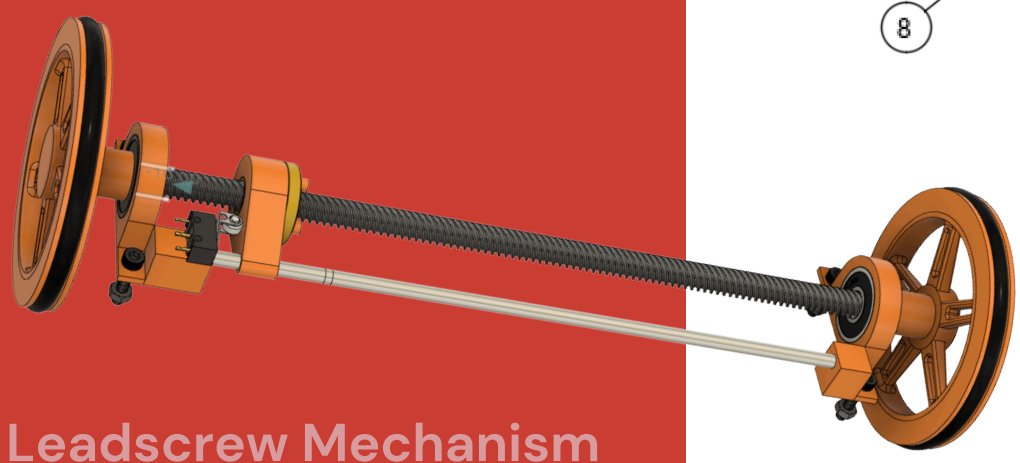
Pulley, Belt, Motor

4 wheel drive system for better alignment of all the wheels



Timing Mechanism

After hitting the wall, the motor rotates at 5 rpm, hitting a limit switch after 12 seconds

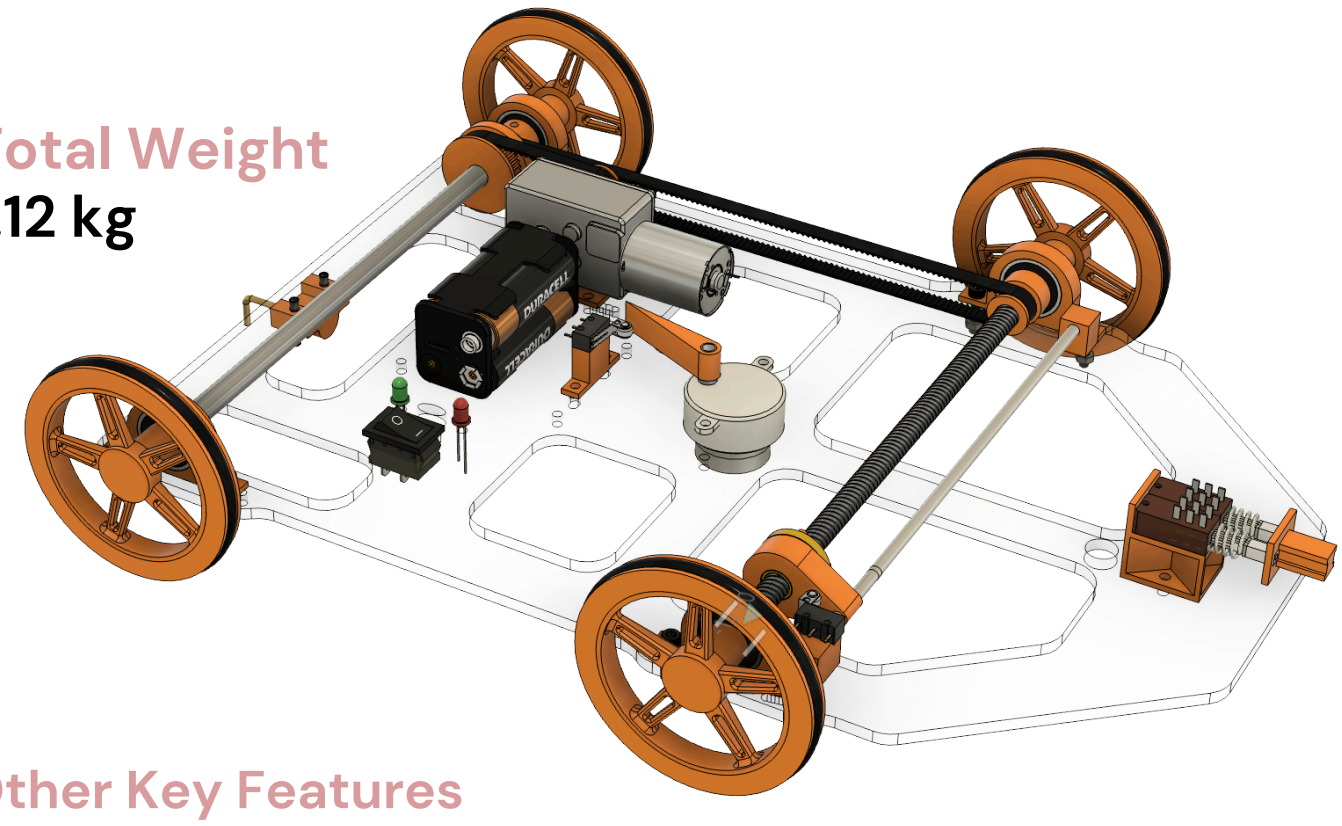


Leadscrew Mechanism

Converts rotational motion to linear displacement for precise distance measurement

Total Weight

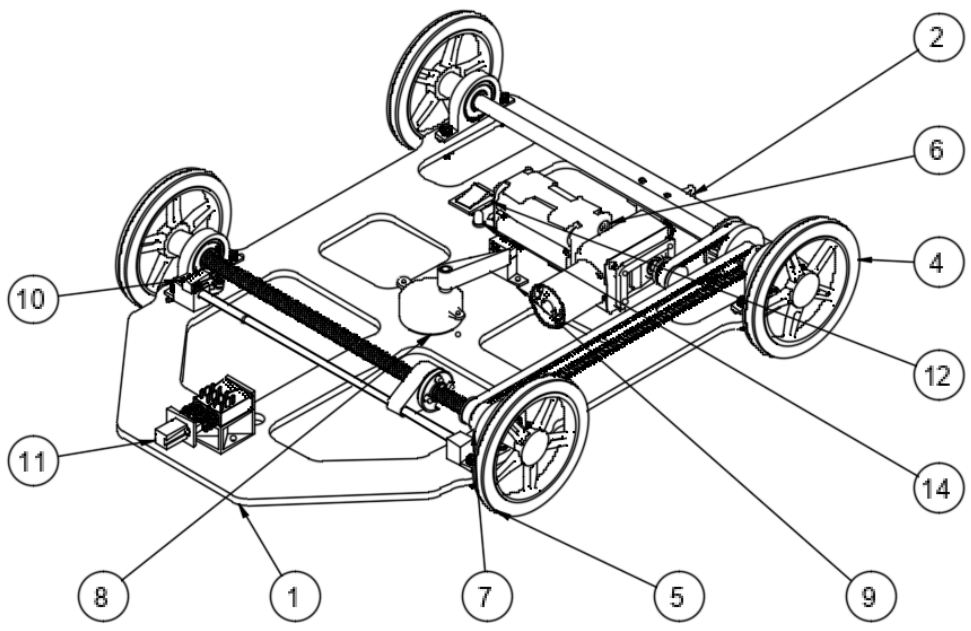
1.12 kg



Other Key Features

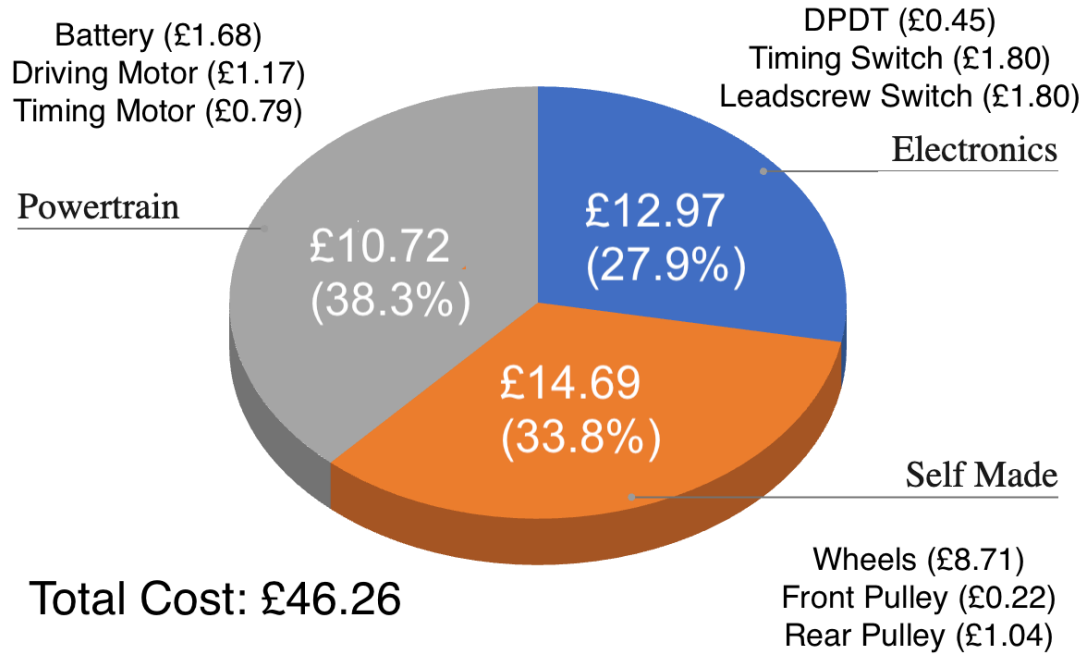
- **Analog Control System:**
  - Simplified system which operates solely on switches.
    - DPDT switch to change polarity.
    - Roller Limit switch which stops the motor when pressed.
- **O Rings:** Rubber O Rings have been put on each of the wheels in order to prevent the car from straying from its straight path.
- **Chassis Design**: Plywood base and 3D-printed PLA components optimized for weight and strength (FEA shows safety factor >6.9).

Engineering Drawing



Item	Qty	Part Number	Material
1	1	Base	Acrylic, Clear
2	1	Datum Point & Mount	
4	1	Rear Axle, Mount & Wheels	
5	1	Front Leadscrew, Mount & Wheels	
6	1	Batteriehalter_4xAA_3	
7	1	Pulley, Motor, Belt	
8	1	Timer Motor	
9	1	Switch Mount	
10	1	Omron D2F-L2	Steel
11	1	Wall switch	
12	1	Power Switch	Discrete Component
13	1	Green LED	Steel
14	1	Red Led	Steel

Bill of Materials



Total Cost: £46.26