



COLLEGE of ENGINEERING
ELECTRICAL ENGINEERING and COMPUTER SCIENCE
THE UNIVERSITY OF TOLEDO

RC TRAILER JACK

Remote Control Trailer Wheel System

Motorized remote-controlled trailer jack —
replacing manual labor with smart engineering.



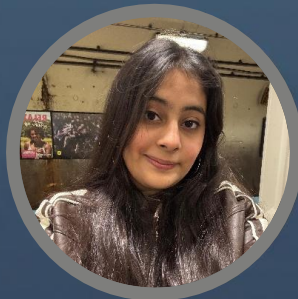
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Need Statement

- *Problem:* Trailer owners often struggle with manual parking, positioning, and connecting to their trailers. Environmental factors often limit vehicle maneuverability, adding to the difficulty.
- *Solution:* Construct a remotely controlled, electronically driven trailer jack to reduce physical effort, improve parking availability, and decrease trailer collisions during parking and hitching.

Engineering Targets



Can Move a Tongue Load of 500 lbs



Movement Speed = 1 mph



Wireless control range of ≥ 30 ft

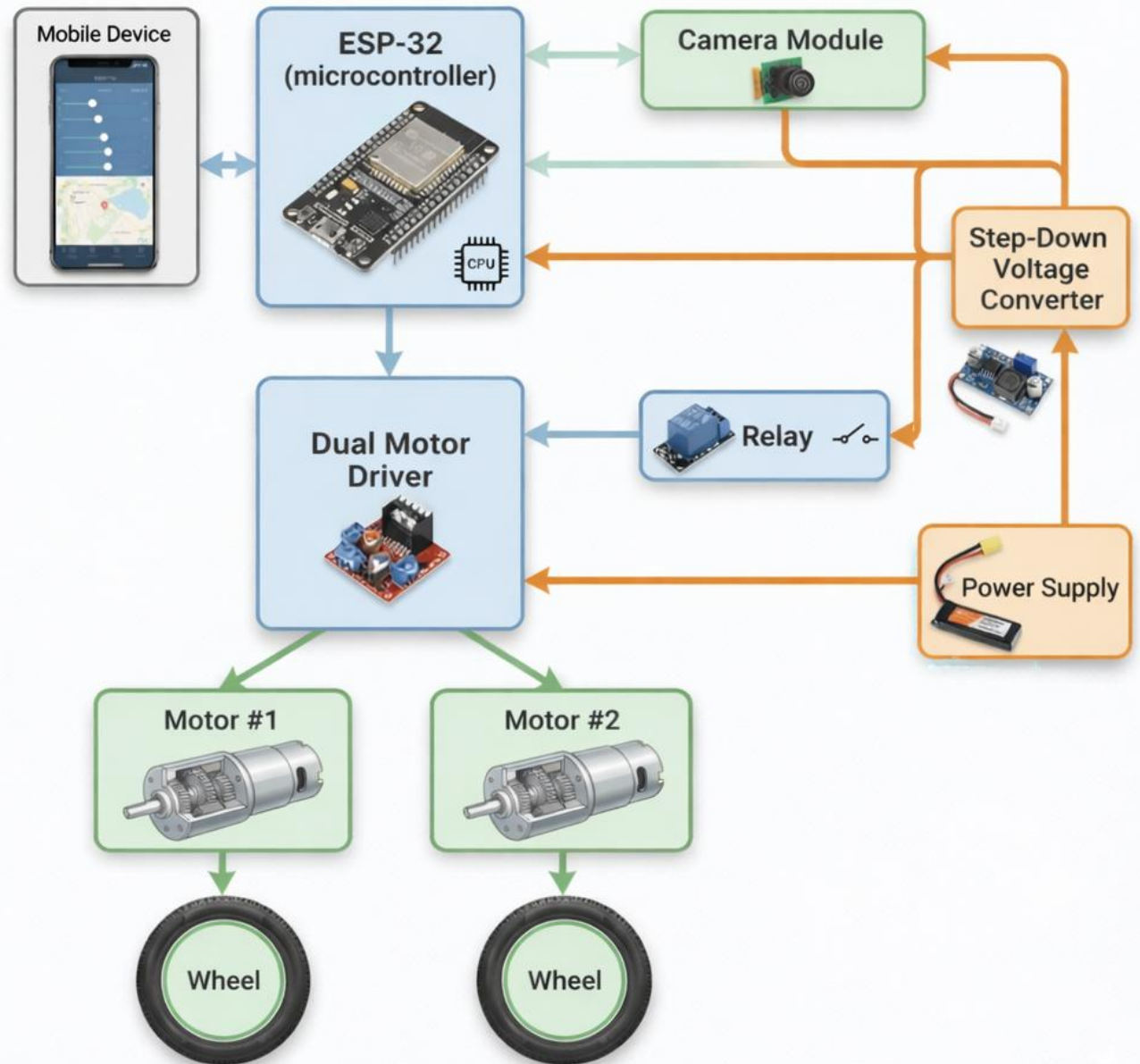


Power Requirement = 12 V



Continuous duty cycle of 10mins

Diagram of Components



Hardware Decisions

- **HAUL-MASTER 1000lb Capacity Swing Away Trailer Jack**
 - Standard Connection
 - Meets weight requirement
- **CM808-029F/E Motors**
 - Provides necessary power
 - $P = F \times v$
 - $F = C_{rr} \times W$
 - Corrects for inefficiencies, startups, and small inclines
 - Bearings and wheels capable of weight requirement
- **2 x 12V Deep Cycle Batteries (In series providing 24VDC)**
 - Obtained with motors for good price
 - Exceeds Runtime Requirements (could run at rated peak for 1 hour)
- **ESP32 Microcontroller**
 - Offered Real-Time Control Capability
 - Flexible I/O (for PWM and Digital)
- **Additional Components**
 - Weatherproof Enclosure
 - Wood
 - Rigid Casters
 - Relay
 - Power Distribution Block
 - Step Down Voltage Converter



Software Design

Software Design

Testing Results

- ✓ Successful test on full-scale trailer
 - Tested with ~600 lbs load and trailer weight
 - Limited mobility due to incorrect trailer type
- ✓ Successful test on mock trailer
 - Tested with ~200 lbs load and trailer weight
 - Full mobility





Target Evaluation



Load of 500 lbs



Movement Speed = 1 mph



Control Range \geq 30ft



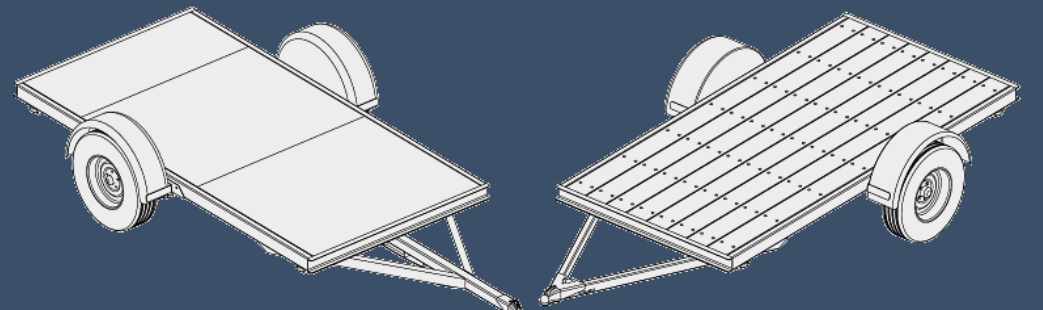
Power Supply 24 V



Duty Cycle $>$ 10mins

Future Improvements

- Self-Parking
- Automated set-up for hitching
- Compatibility with multiple trailer styles
- Reduce battery size
- Reduce size and/or improve placement of motors



References

1. Cytron Technologies. (n.d.). SmartDriveDuo Arduino examples. GitHub. https://github.com/CytronTechnologies/Cytron_SmartDriveDuo/tree/master/examples

Thank you!
Any Questions?

