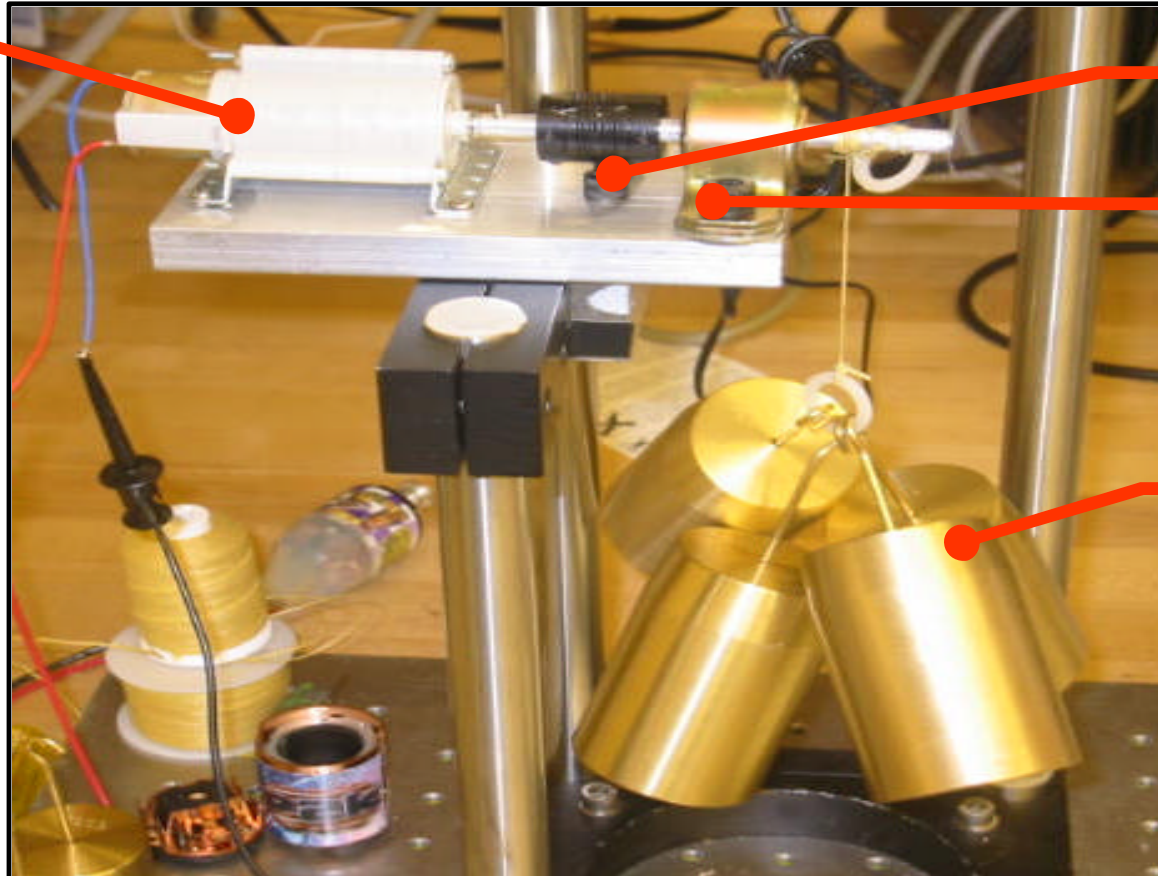


# Motor and Gear Charts: **Design I**

Motor/Gear  
Box

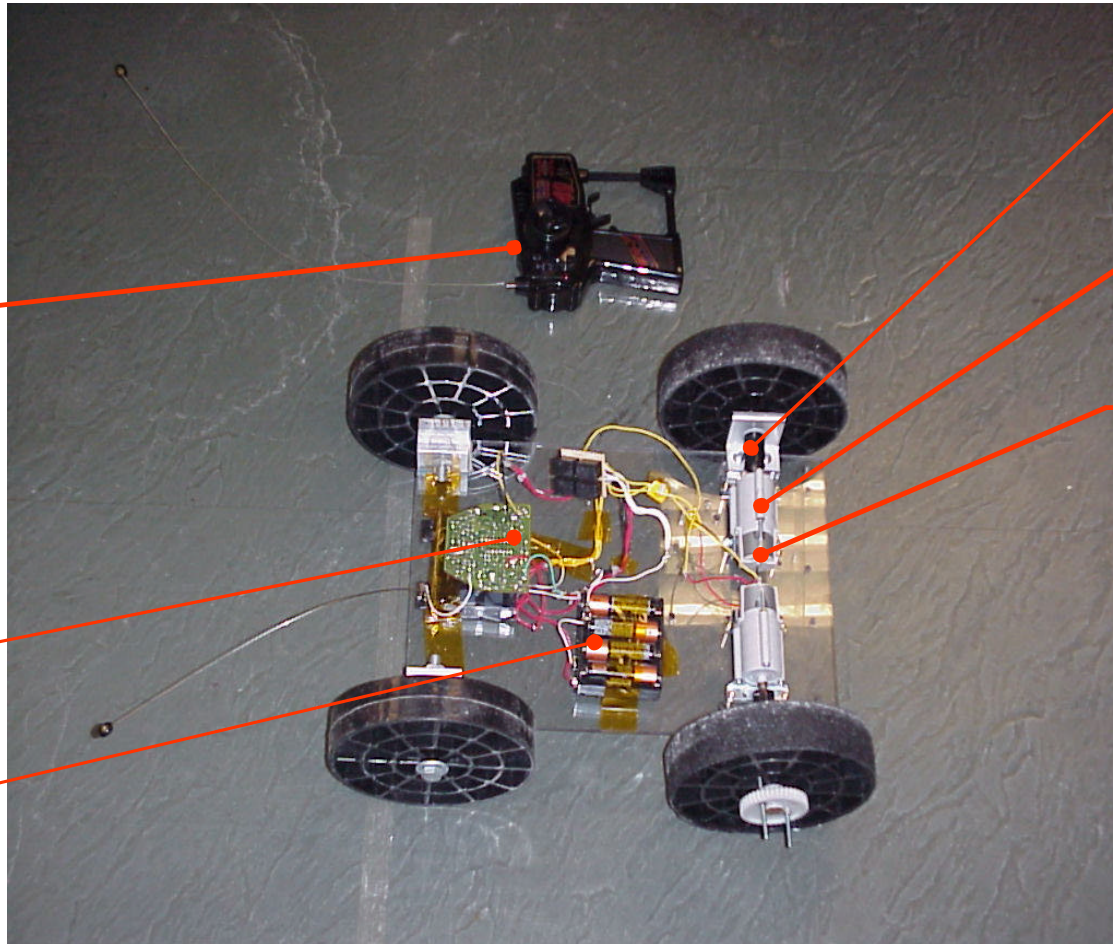


Coupling

Bushing  
w ball  
bearings

Load

# Motor and Gear Ratio: **Design II**



Coupling

Gear Box

Motor

Remote

Receiver

Batteries

# MATLAB<sup>®</sup> Script: Simulation

- MATLAB<sup>®</sup> program and Torque-speed files on 2.007 website software/tools
- Interface: Inputs and Outputs
  - Car parameters
  - Distance
  - Choose Gear Ratio to minimize your time
  - Output time you needed
- Drive chain efficiency determined by experiments
- Choose different parameters to **optimize** the performance of your car

Untitled

### Inputs

Gear Ratio:	<input type="radio"/> 1:5	Rotational Inertia of one Wheel [kg*m <sup>2</sup> ]:	0.0005
	<input type="radio"/> 1:20	Mass of the Car [kg]:	1.65
	<input checked="" type="radio"/> 1:100	Radius of the Wheel [m]:	0.063
	<input type="radio"/> 1:400	Friction Coefficient:	0.2
Number of Wheels:	4	Distance [m]:	8
Number of Driving Wheels:	2	Drive chain Efficiency:	0.8

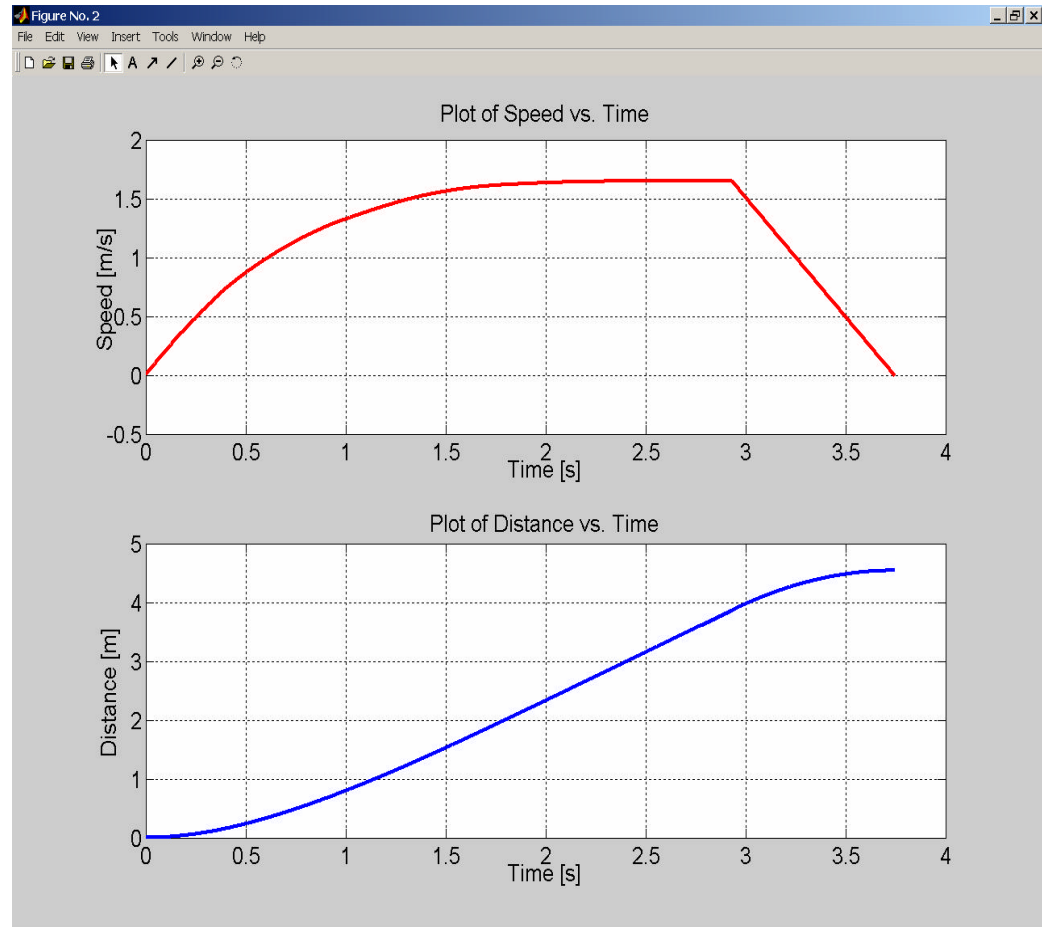
### Outputs

Acceleration Time [s]:	3.379	Deceleration Time [s]:	0.81401
Constant Velocity Time [s]:	1.79628	Total Travel Time [s]:	5.98929

Plot

# Output Plots

- Acceleration limited by torque-speed and friction
- Maximum speed from acceleration and time
- Deceleration limited by friction and torque
- Two plots
  - Speed vs. Time
  - Distance vs. Time



# Compare Simulation & Experiment

- Using the simple car
- 1:100 Gear Ratio
- Two wheel drive
- Efficiency about 50%

