Mousetrap Car

Jack Yu, Thomas Jin, and Eric Son

Meet the creators

Thomas Jin

- Group Leader - managed team building and overall work
- Main Builder - created most of vehicle

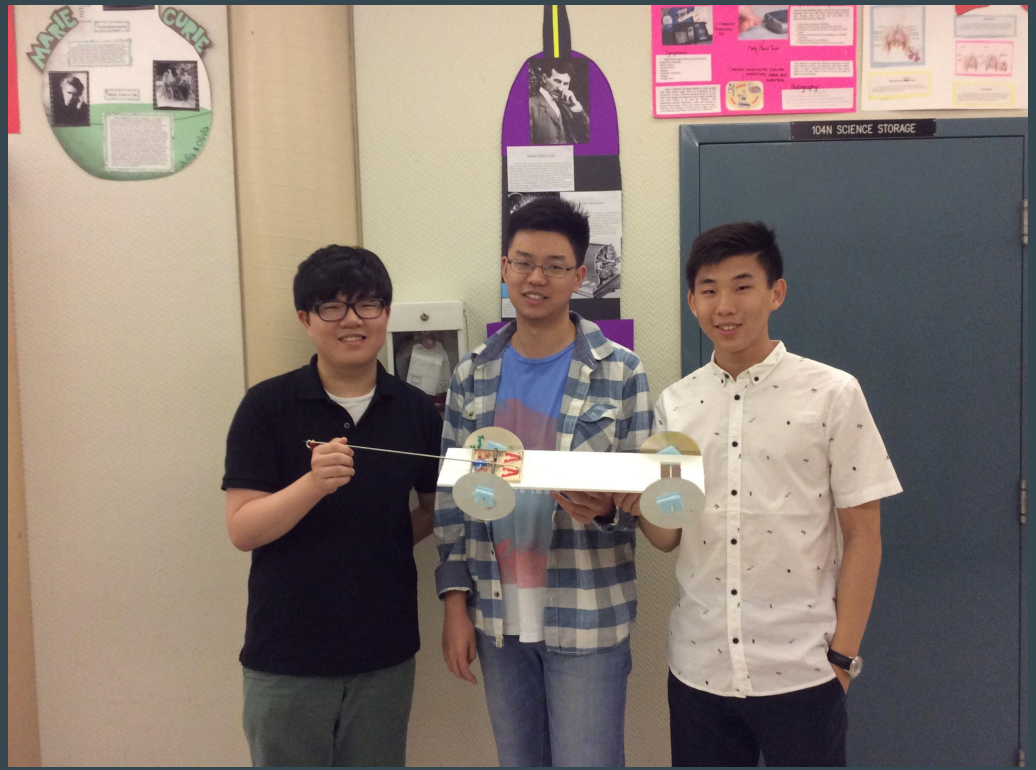
Eric Son

- Safety Person - looked over the building of the car
- Designer - drew blueprints of the car and managed powerpoint work

Jack Yu

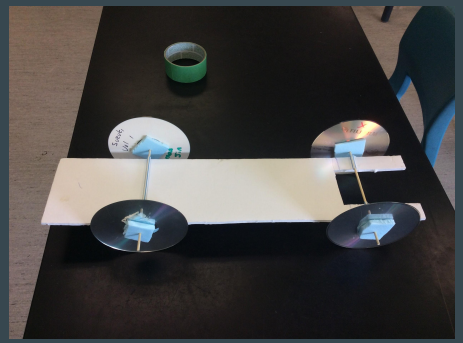
- Elgineer - came up with the first design of mouse car
- Mathemetician - calculated measurements so the car would work

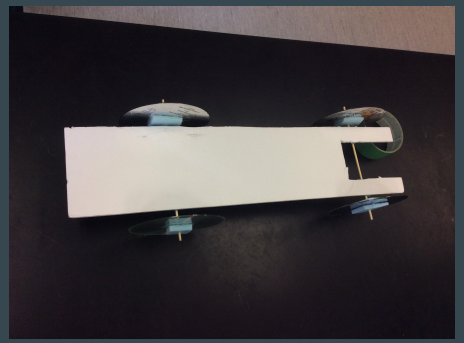
Meet The Team



AlphaGo 1.0

- The idea behind the inital creation of the mousetrap car was to find a light and stable frame for the car allowing for a longer distance, as well as shorter time.
- As a result, we decided on using a special type of styrofoam as the frame.
- The creation of AlphaGo 1.0 went very well and things seemed promising.
- The wheels were working fine, and the lightness of the car was something we were proud to have.
- Unfortunately, the lightness of the frame would not hold up to the pressure from the mouse traps.

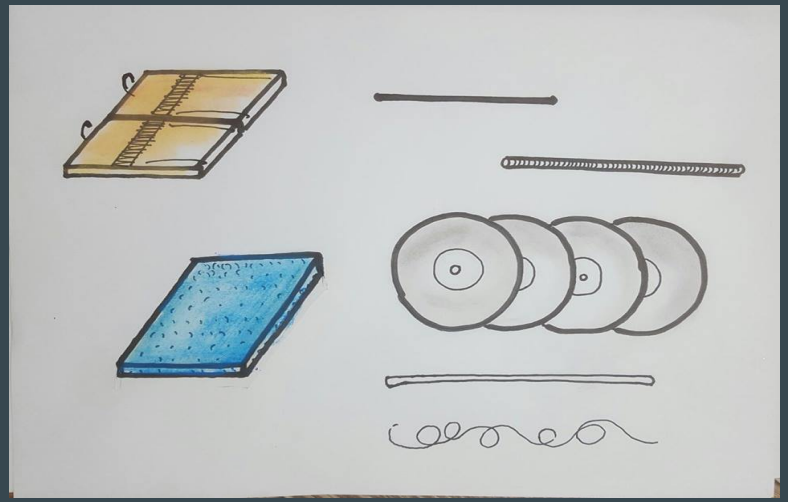


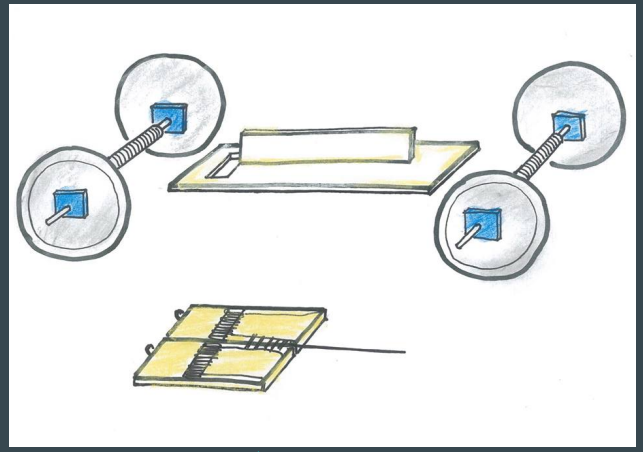


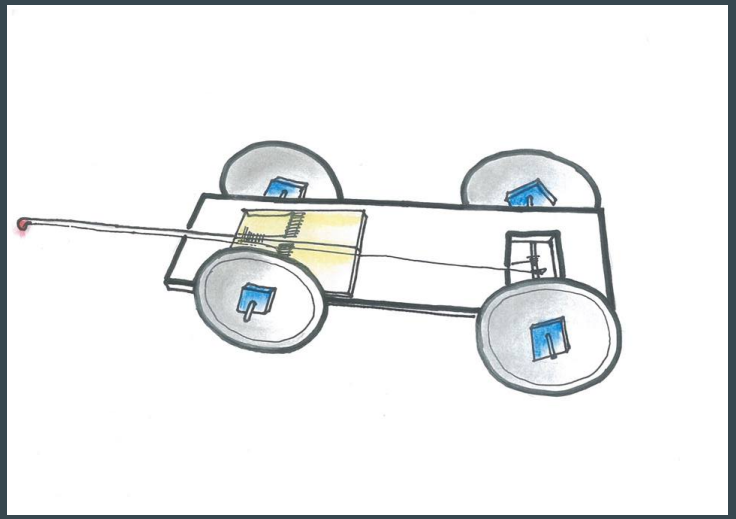
The Death of AlphaGo 1.0

- AlphaGo 1.0 failed to see any action due to the fragileness of the material, and it's instability
- Although the styrofoam was slightly lighter, the initial plank was very weak in comparison to AlphaGo 2.0.
- In the first test, after everything was done, the plank completely broke in the middle, deeming it unusable.
- We switched over to poster board cardboard which was much more stable and to further support it, we added an extra plank below creating the unique T-Bar.

Blue Prints of AlphaGo 2.0



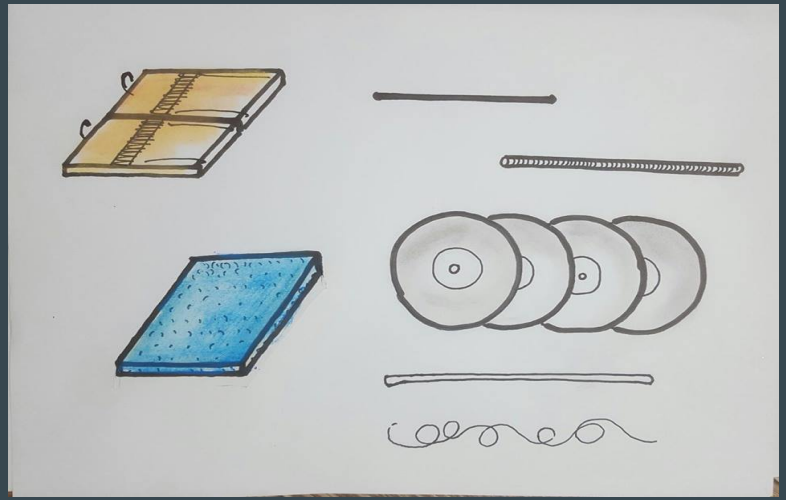




- The only changes made was the stronger frame, allowing for smooth travel.

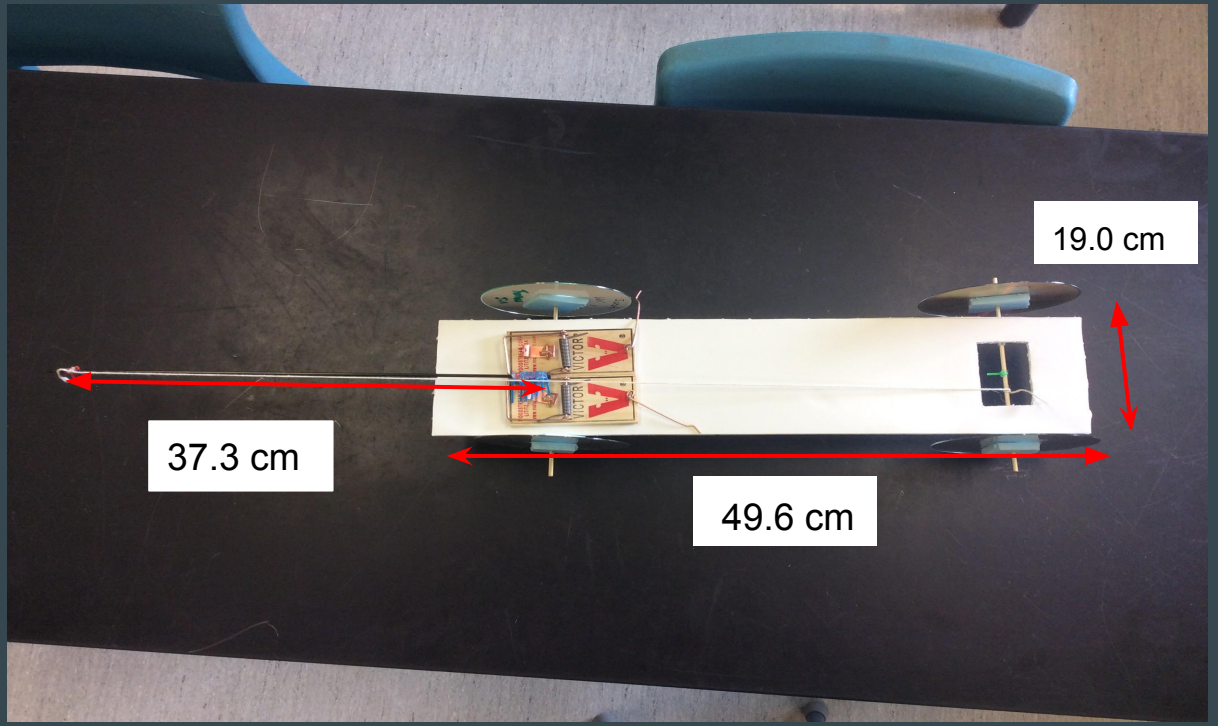
Materials Used to Create AlphaGo 2.0

- 4 CD’s
- 12 small styrofoam stabilizers
- 2 planks of poster board cardboard
- 2 straws
- 2 wooden sticks
- String
- Many twist ties
- Carbon Fiber rod
- 2 mouse traps



Measurements of AlphaGo 2.0

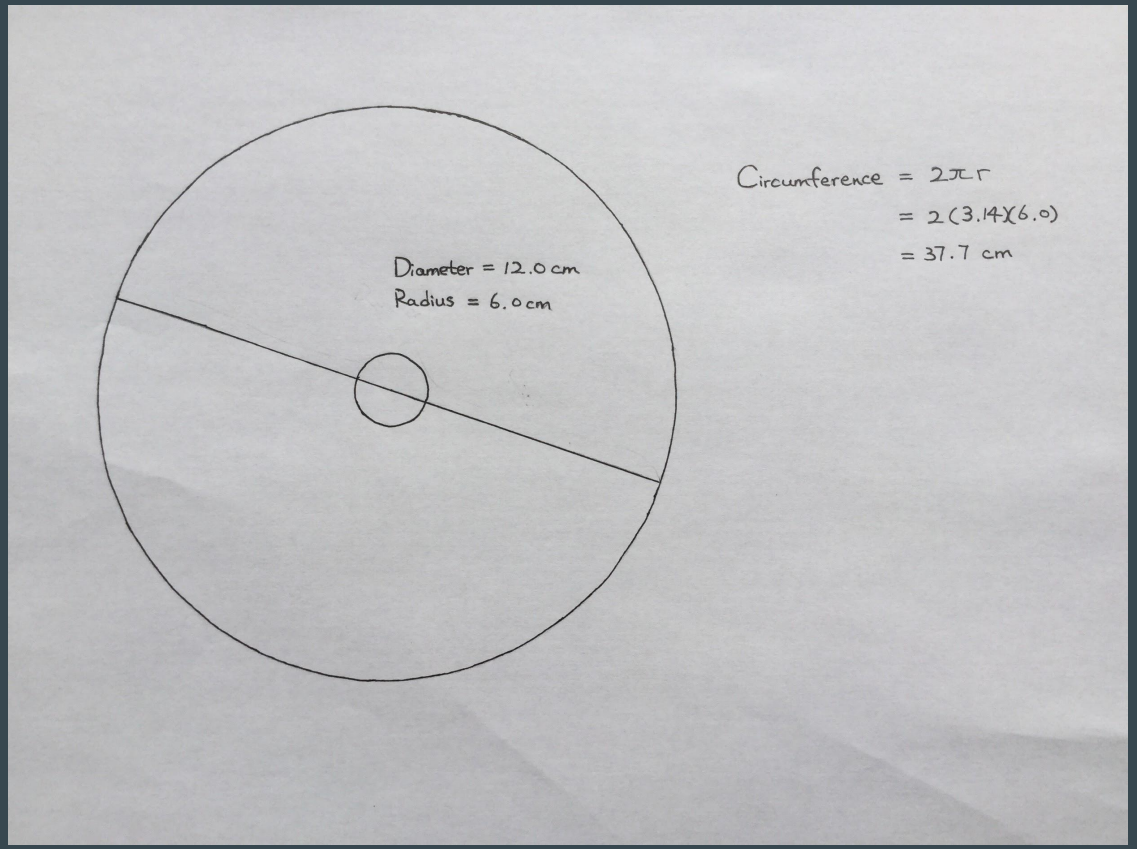
- Length: 49.6 cm
- Width: 19.0 cm
- Height: 12.0 cm
- Mass: 0.164 kg
- Rod: 37.3 cm



Measurements of the Wheel

Radius: 12.0 cm

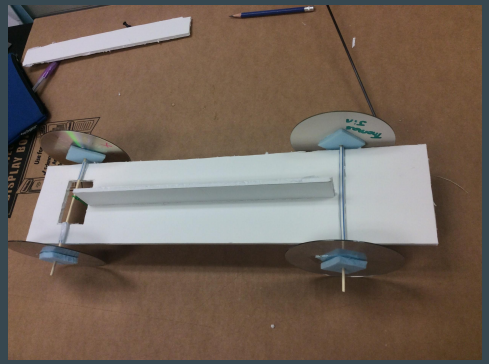
Circumference: 37.7 cm



Special Features

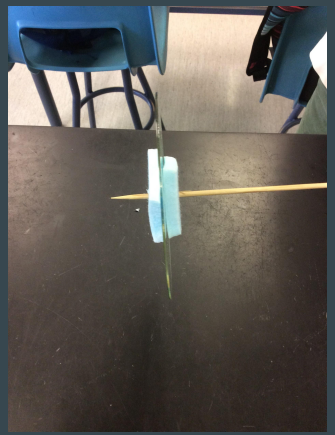
T-Bar

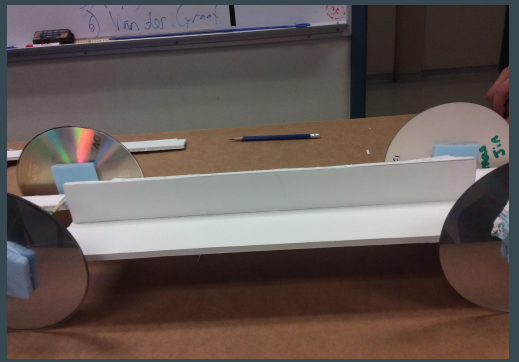
- Serves as stabilizer for the entire vehicle. Prevents vehicle from snapping when pulled back.



Styrofoam Wheel

- Stabalizes the wheel so that it doesn't come off during the race.





Calculations of the Measurements

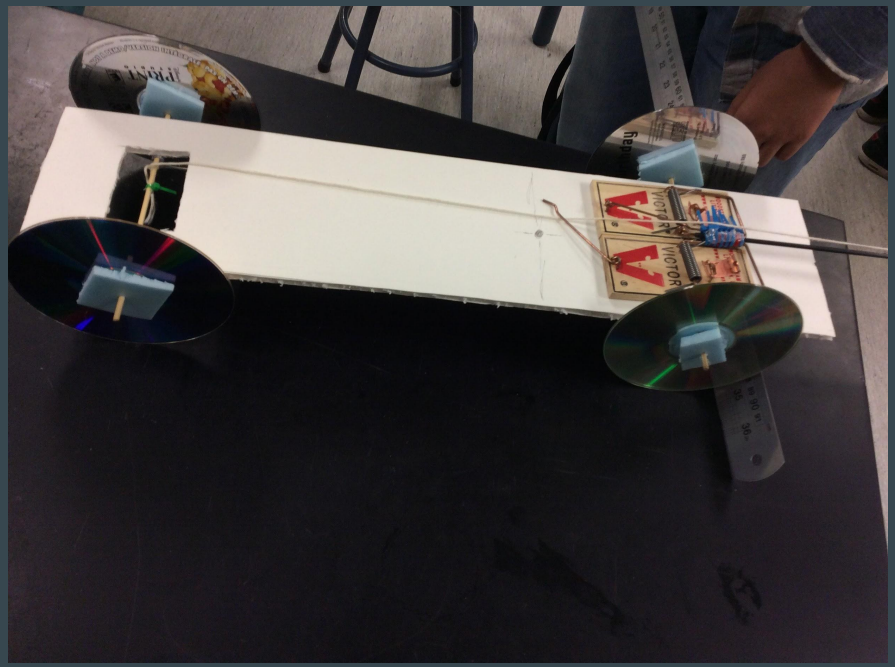
Speed=distance/time = (10.95*2)/(19.85) = 1.10 m/s

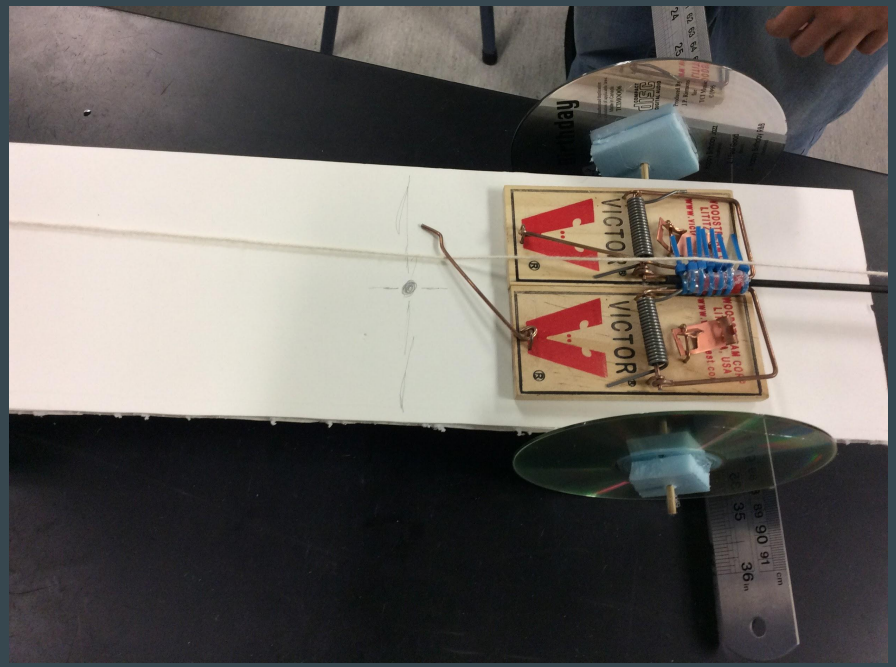
Momentum = mass*velocity=(0.164)(1.10) = 0.180 kgm/s

Kinetic energy = ½*mass*velocity^2 = ½(0.164)(1.10)^2 = 9.92*10^-2 J

Power = 2.0*10^-2 W
Calculation:
Start with equation: displacement = initial velocity*time+½acceleration*time^2
we get (10.95*2) = (0)(19.85)+½(a)(19.85)^2
Acceleration = 0.111 m/s^2
Force = mass*acceleration
Energy(work) = force*distance
Power = work/time
P = mad/t = (0.164)(0.111)(10.95*2)/(19.85) = 2.0*10^-2 W

Center of Gravity

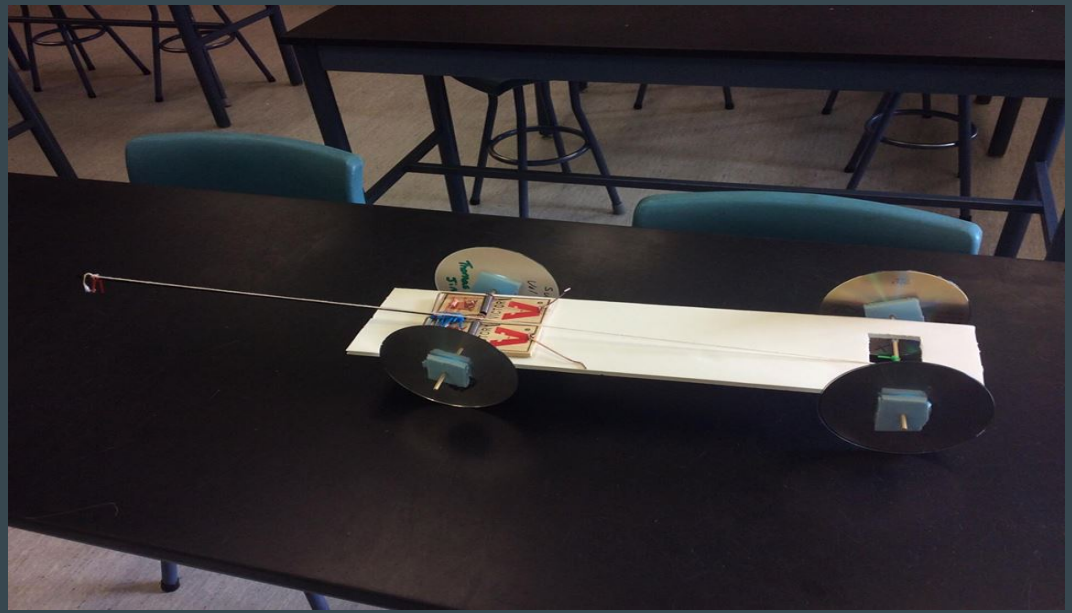




Video of Balancing Car

Final Product

- This was the final product of AlphaGo 2.0.
- We were lucky enough to have to only start over once, and make minimal changes.



Video of working Car

Conclusion

- Overall we were quite satisfied with the finishing product
- Light, stable, fast, etc.

What we have learned

- Lengthy rod allows for more rotation of the wheels which grants more displacements.
- Elongate the length of string does not help in terms of creating greater distance.
- Using the original material of the car while also using the T-Bar method to turn the fragile frame to more stable.

Future Improvement

- Wheels can be better lined up so that they are 90 degrees to the ground
- Use materials with greater radius as wheels
- Connect the hammer of mouse traps with better method for easier set up
- Length the entire car and rod to allow it travel longer distance
- Use mouse trap with greater power for faster speed