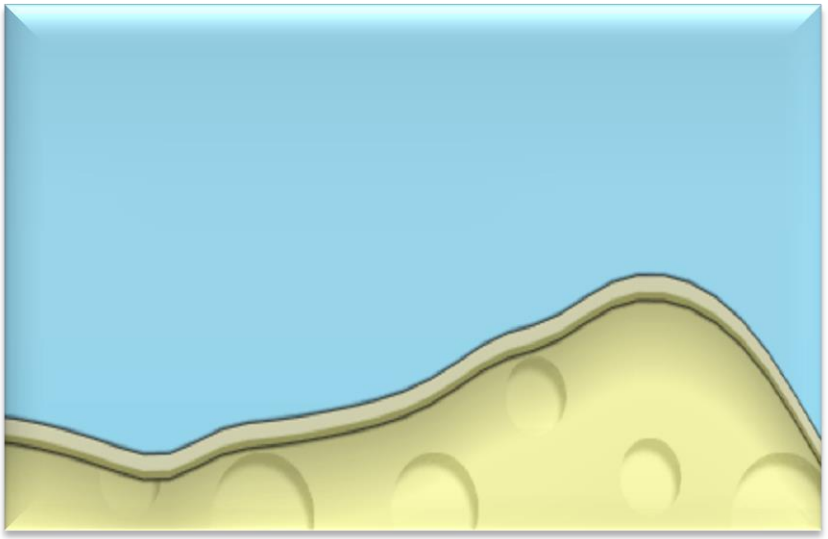
# POSTER ID 29

# HILL CLIMB RACING

## FAILURE MODE ANALYSIS

LUKE LIU, TIMOTHY LIU AND MASON CHEN



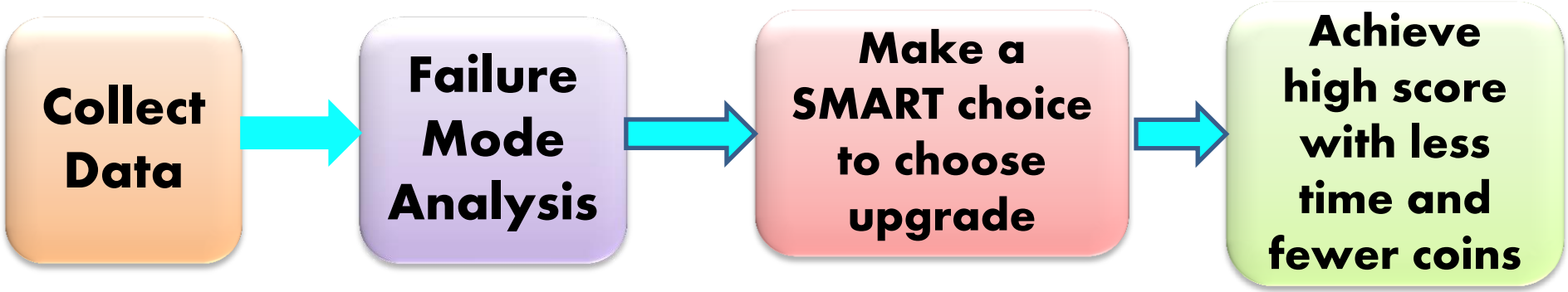


© IEOM Society International

# Project Objective

- I love to play video game but I do not have much play time
- I need to play smart, not hard to minimize playing time.

## MY GAME STRATEGY




© IEOM Society International

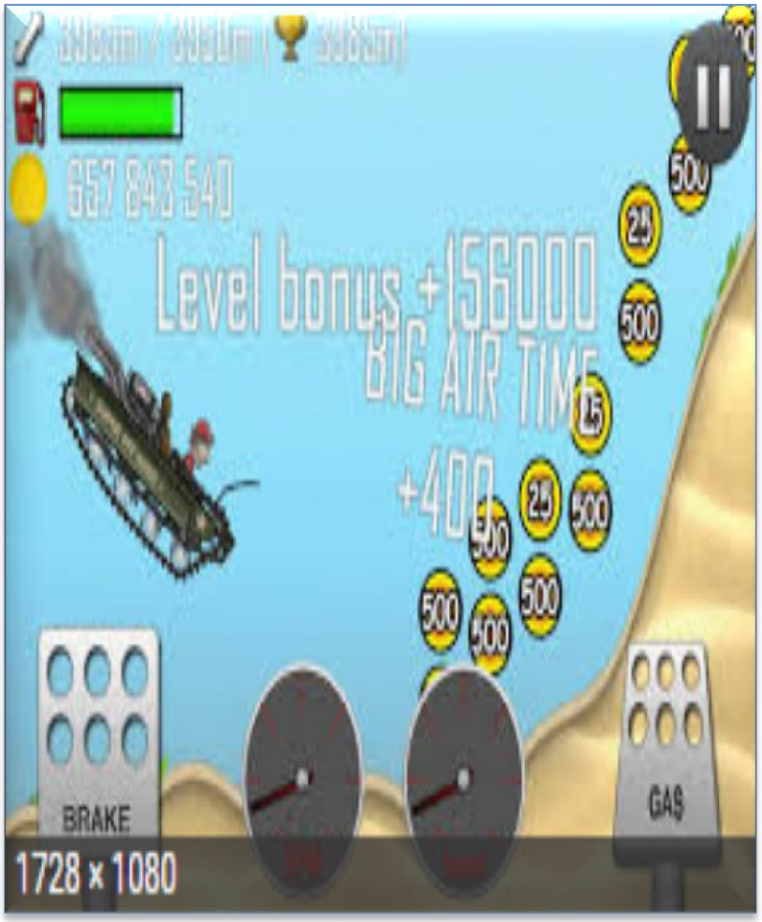
# Stage And Car

I choose the Desert stage to play the game.

- Desert stage has lots of high/low bumps.
- Desert stage also has slippery ropes.

I choose Super off-road car to play because

- Super off-road has tracks for traction or friction.






© IEOM Society International

# Super Off-Road Upgrade Options

**ENGINE**
5/20

**TRACKS**
5/20

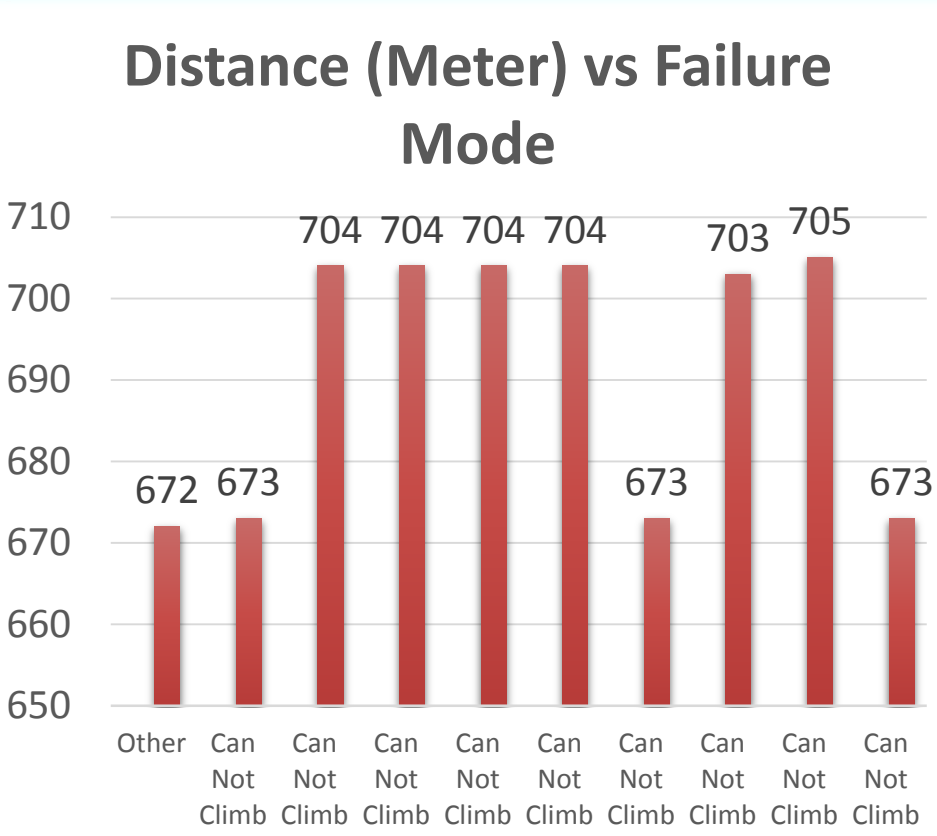
**DOWNFORCE**
5/15

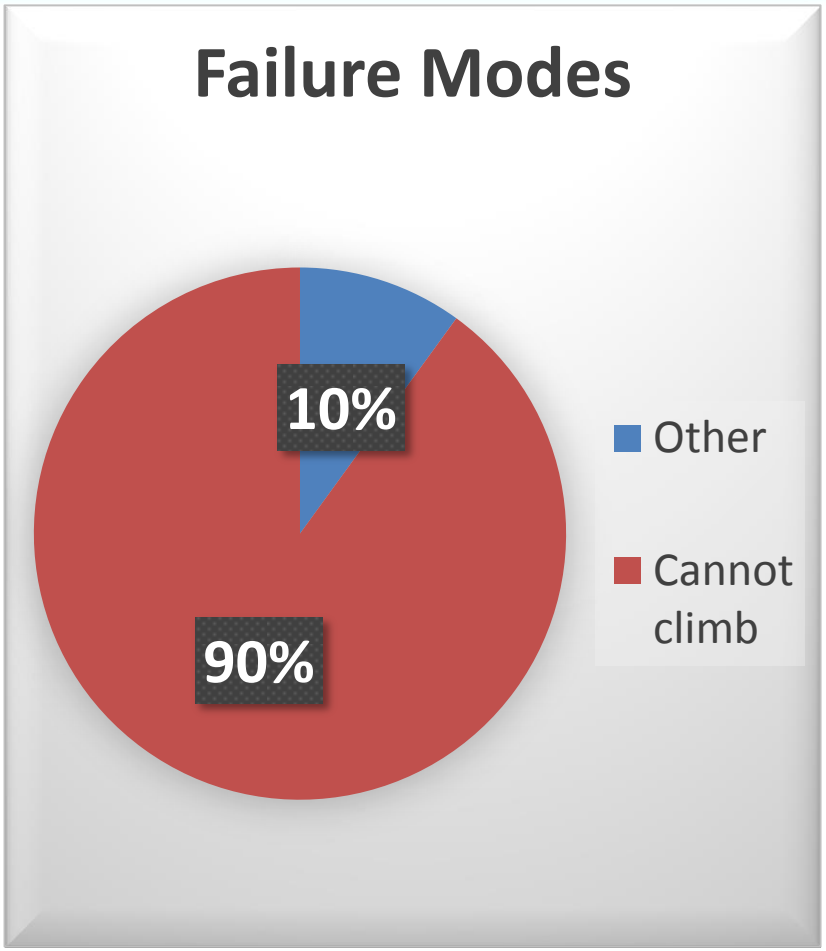
**Initial Setting**

**FUEL**
5/15

© IEOM Society International

# Baseline Failure Mode Data




Engine=5 Tracks=5
Downforce=5 Fuel=5

© IEOM Society International

# How can I solve “Cannot Climb” Failure Mode?

Cannot Climb Hill

↓

Lack Of Power

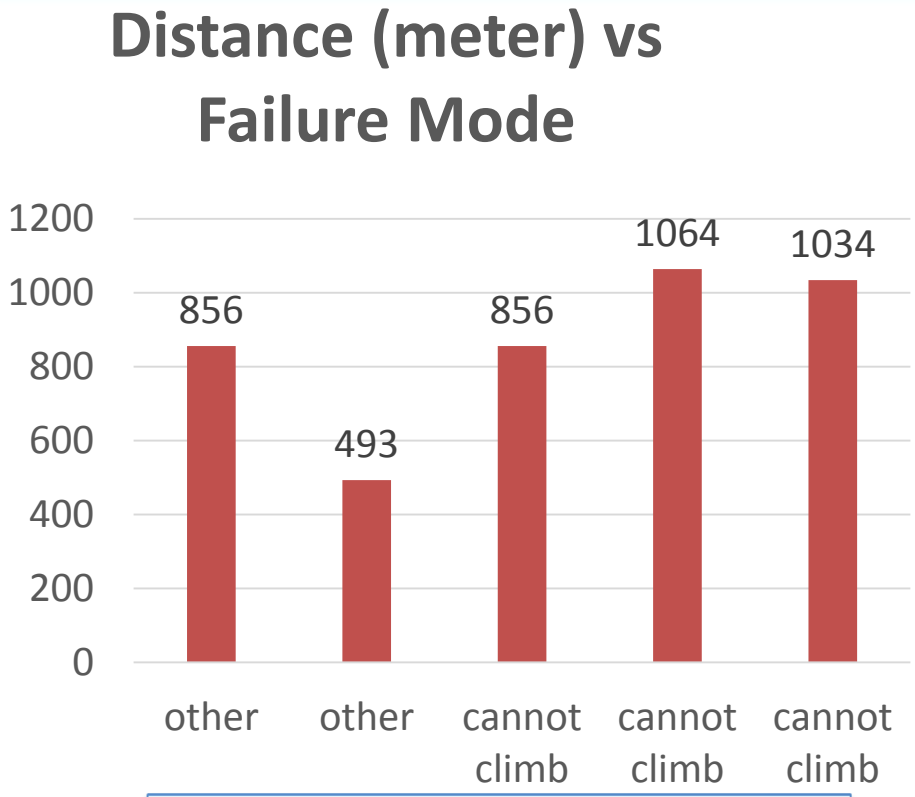
↓

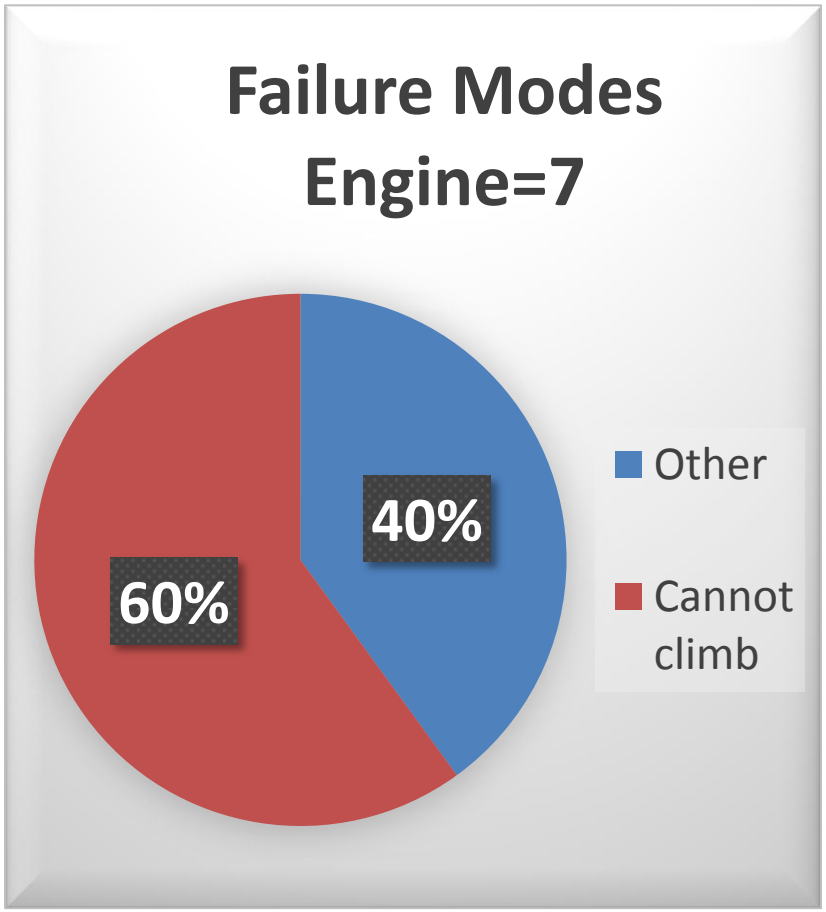
Powerful Engine



© IEOM Society International

# Upgrade Engine Data Analysis

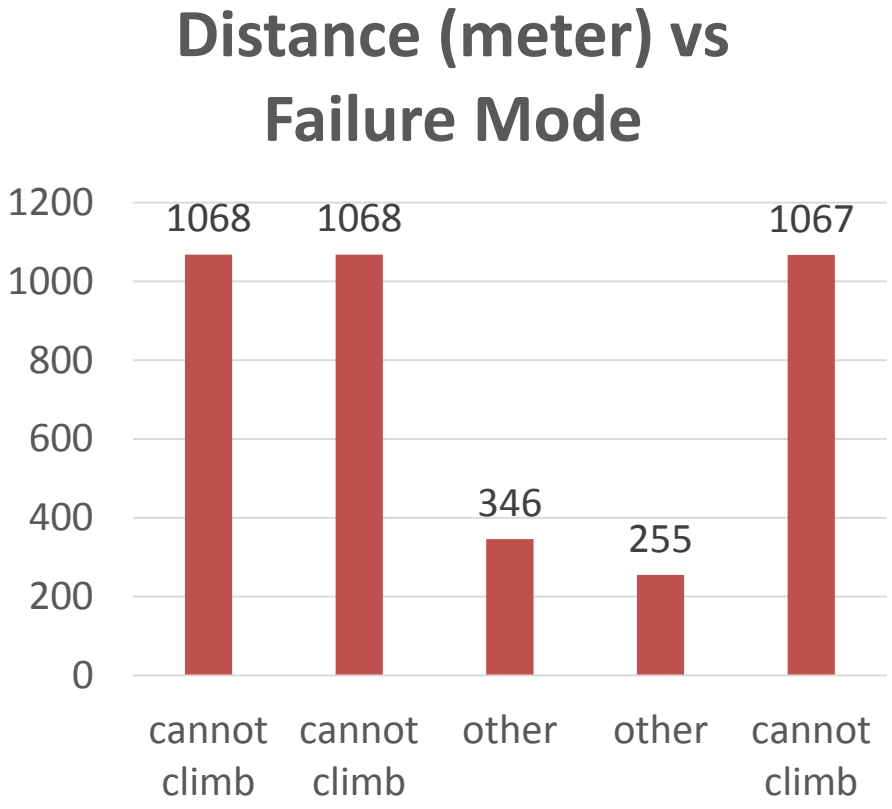


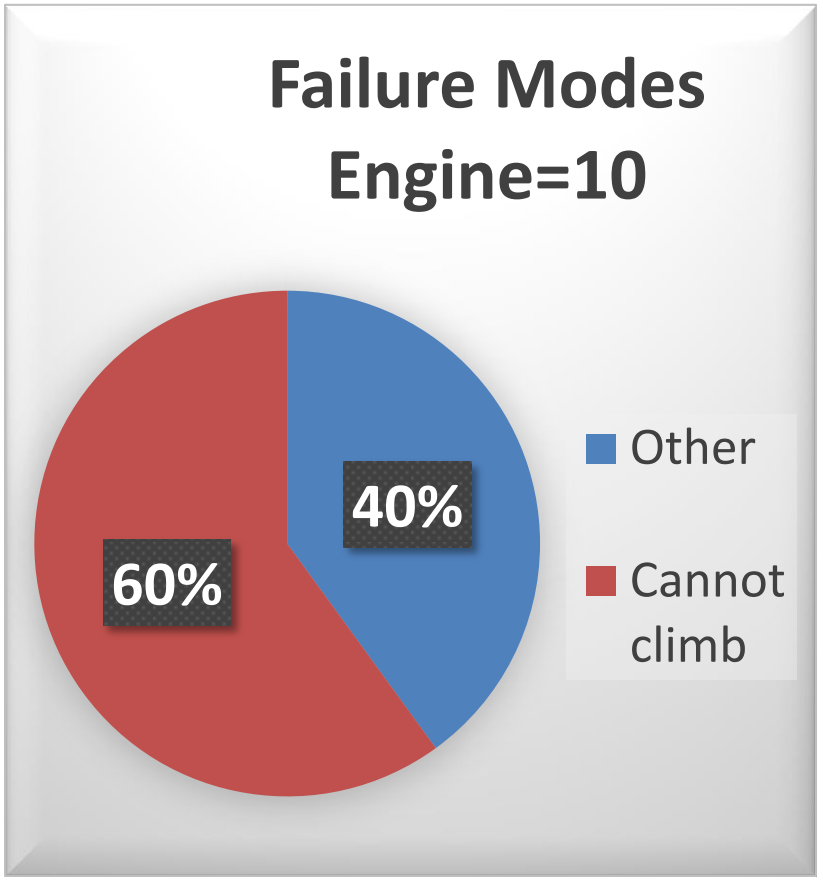

Engine=7 Tracks=5
Downforce=5 Fuel=5

© IEOM Society International

# Upgrade Engine Data Analysis

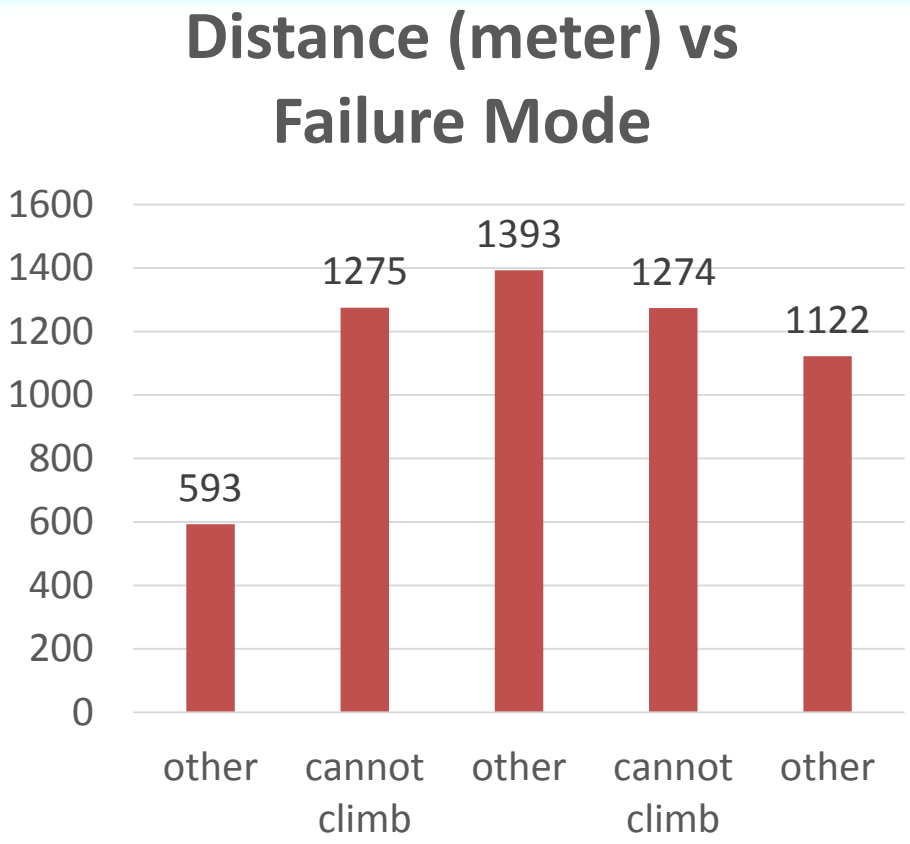


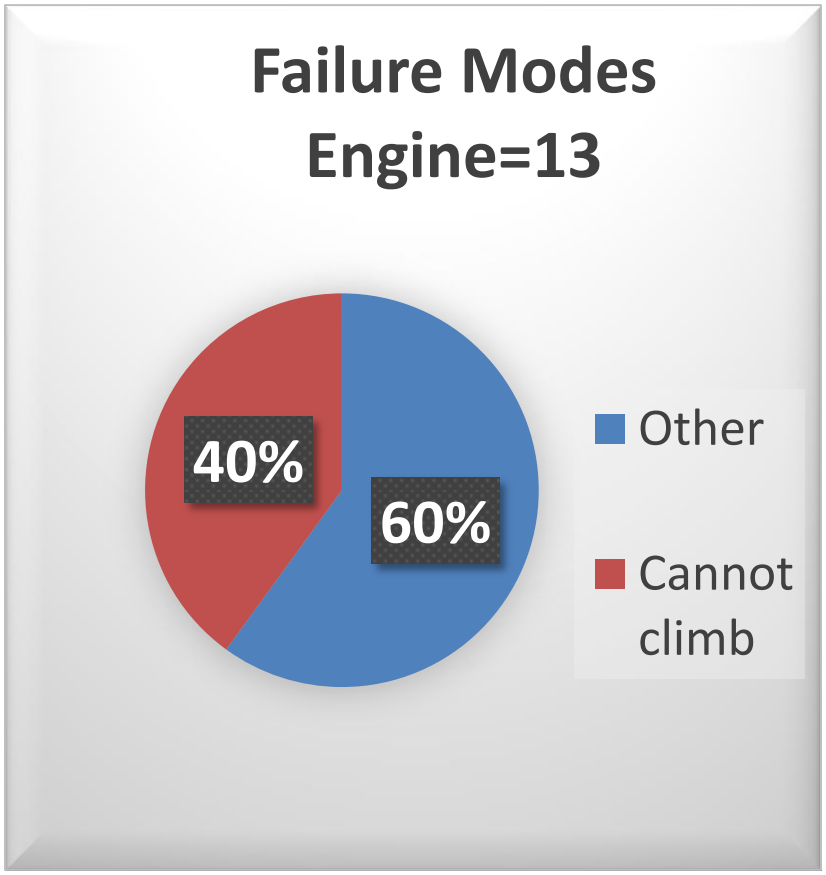

Engine=10 Tracks=5 Downforce=5 Fuel=5




© IEOM Society International

# Upgrade Engine Data Analysis

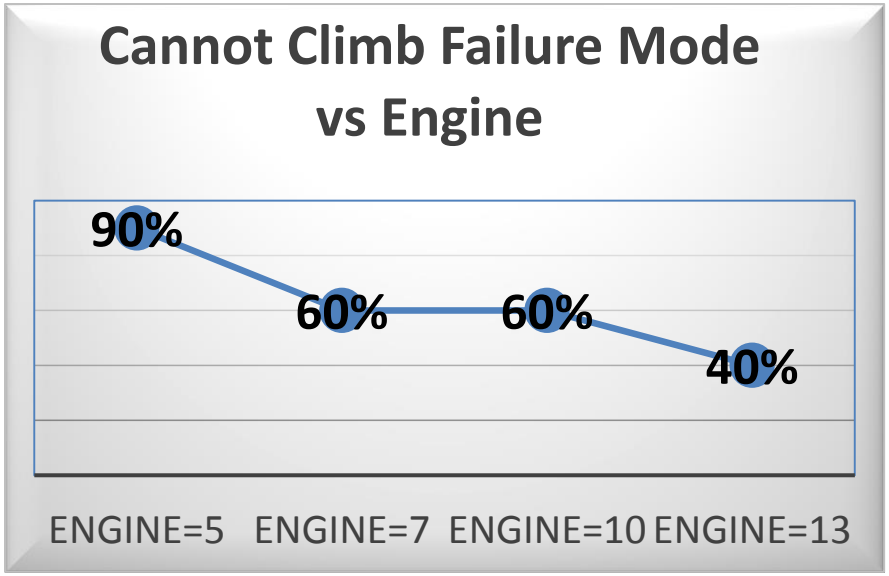


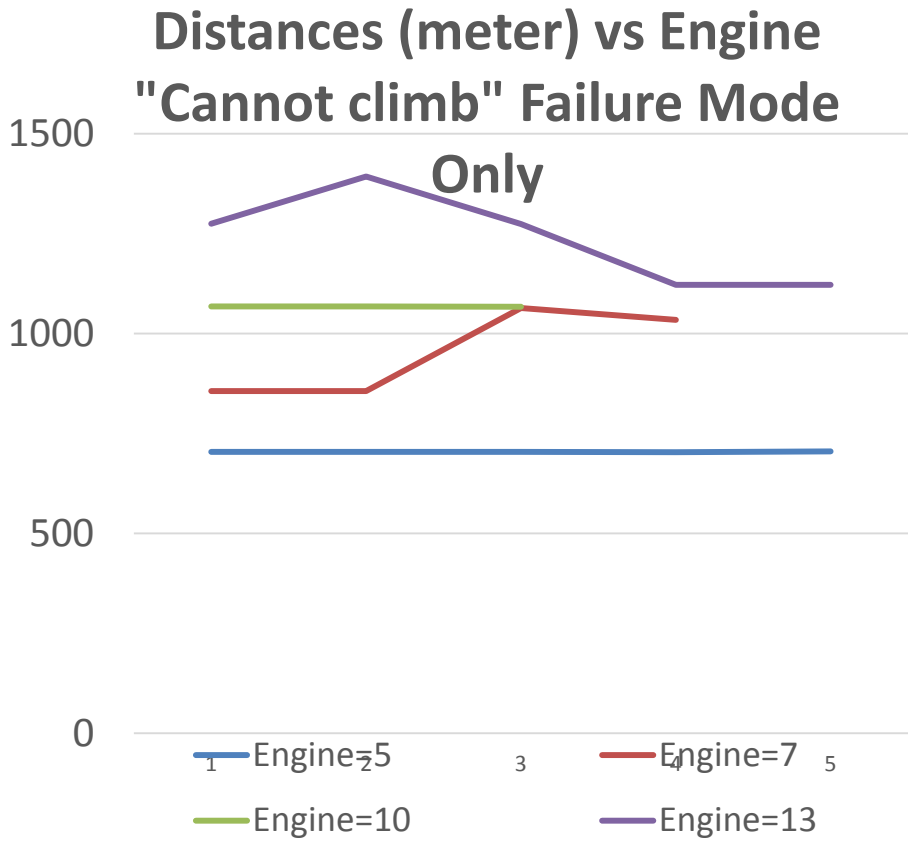




Engine=13 Tracks=5
Downforce=5 Fuel=5

© IEOM Society International

# Upgrade Engine Data Analysis




- Distance improves
- Cannot Climb Failure Percent decreases

Tracks=5 Downforce=5 Fuel=5



© IEOM Society International

# Decision

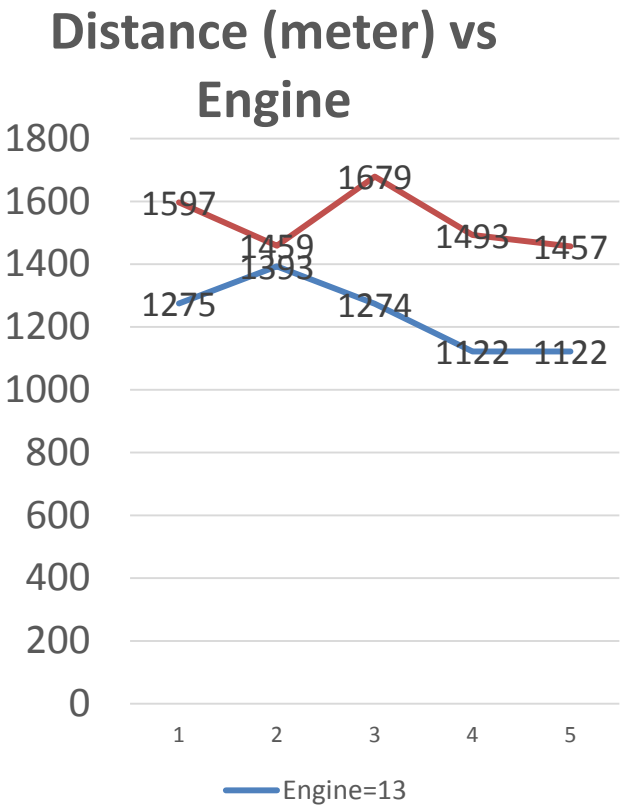
## I decide to use my coins to upgrade BIG ENGINE

**BUY**

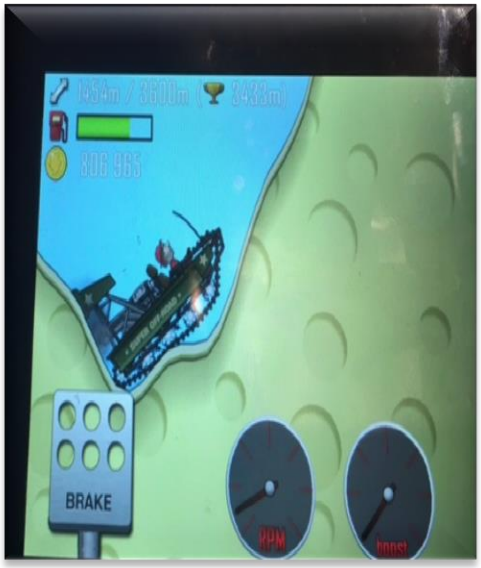
Download from Dreamstime.com

© IEOM Society International

# Powerful Super Off-Road – BIG ENGINE




Tracks=5 Downforce=5 Fuel=5

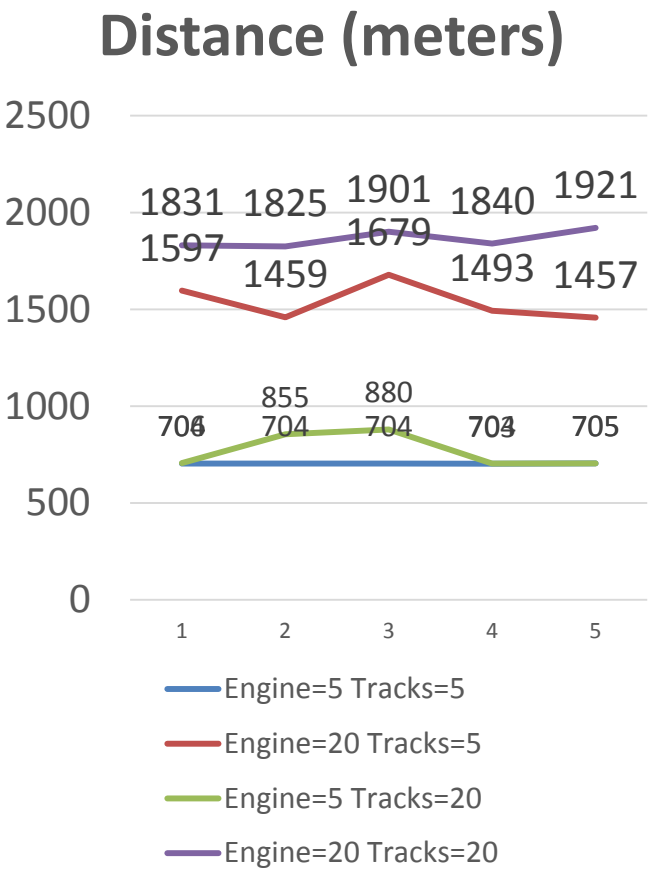


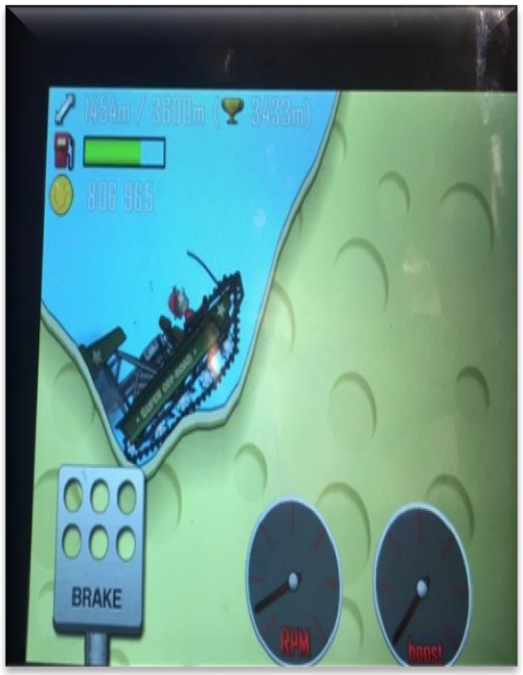

Failure At this Area

- The distance improves but it fails often at this area. The car cannot climb.
- Engine has fully upgraded. I decide to upgrade Tracks to have better traction and better power delivery to the ground

© IEOM Society International

# Super Off-Road – BIG ENGINE & ROUGH TRACKS



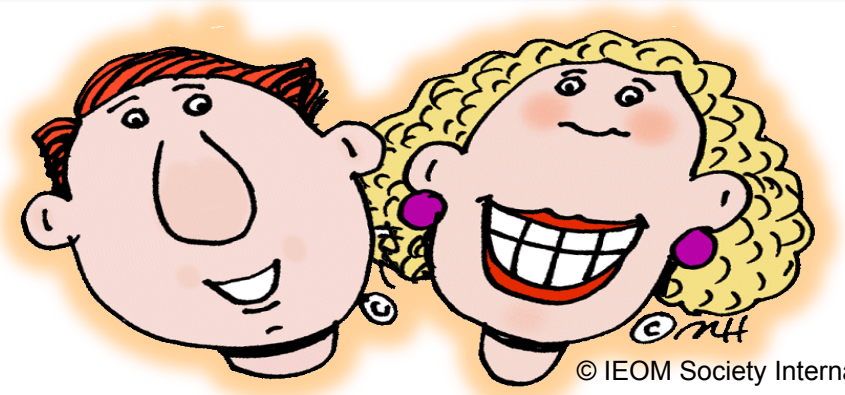

PASS The Previous Failure Area

The car no longer fails at the same area after upgrading to Tracks=20 and Engine=20.

© IEOM Society International

# Conclusion

- I learn a lot by playing the video game.
- I learn how to use Excel to draw graphs.
- I learn how to analyze data.
- My parents are happy to see me play video game.



© IEOM Society International

# Future Work

- Develop skills to control Super Off-road to avoid user failures
- Try on other similar stages: Artic, Beach, and Countryside

- Study other upgrade technologies: Downforce and Fuel

© IEOM Society International

# The End

**IN MY LIFE,** I've lived,
I've loved, I've lost,
I've missed, I've hurt,
I've trusted, I've made mistakes,
but most of all,
**I'VE LEARNED.**

© IEOM Society International