



Booking.com

Booking Home : Quality Engineering

# Automatic test verification

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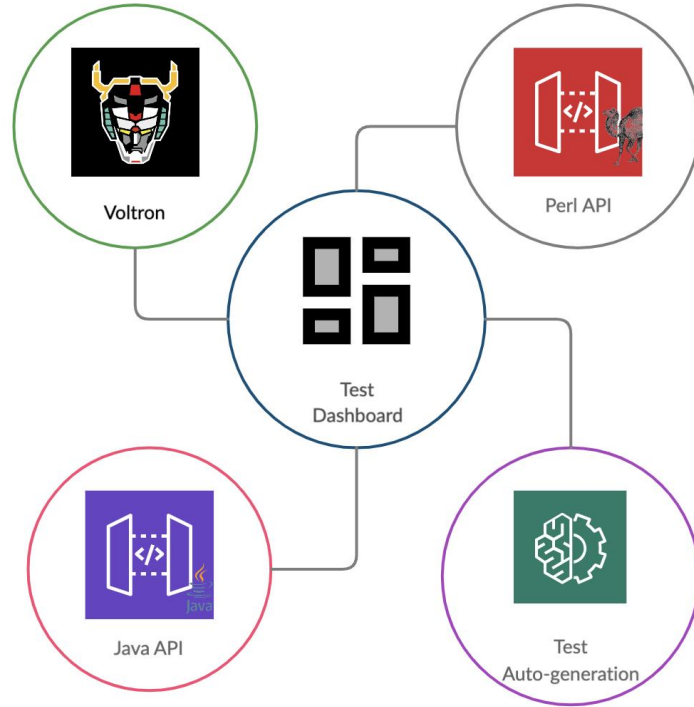


**Go Automation.**

## Agenda

1. Automation in Booking Home
2. Testing and Quality Engineering
3. Metamorphic Testing
4. Case Study: Log Based Auto-verification
5. Case Study: Test AI Image Recognition

# Test Automation in Booking Home.

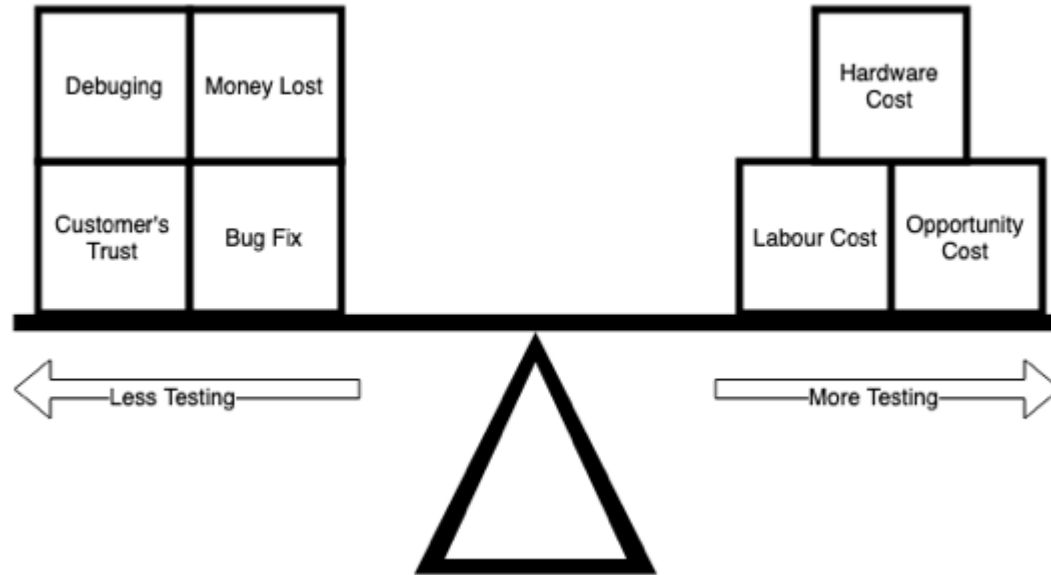


A background image of the Golden Gate Bridge in San Francisco, viewed from a high angle looking down the length of the bridge towards the city. The bridge's iconic red-orange towers and suspension cables are prominent against the blue sky and water. The city skyline is visible in the distance across the bay.

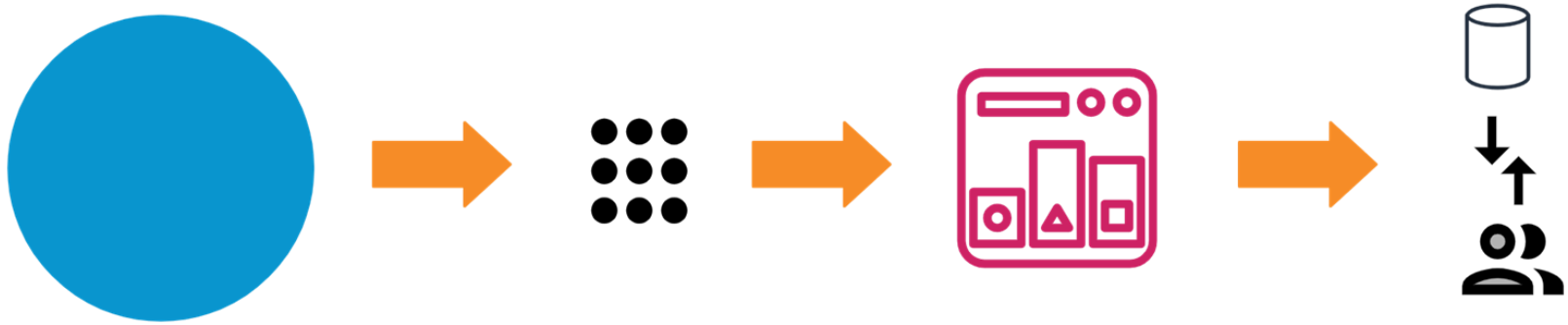
# Testing and Quality Engineering



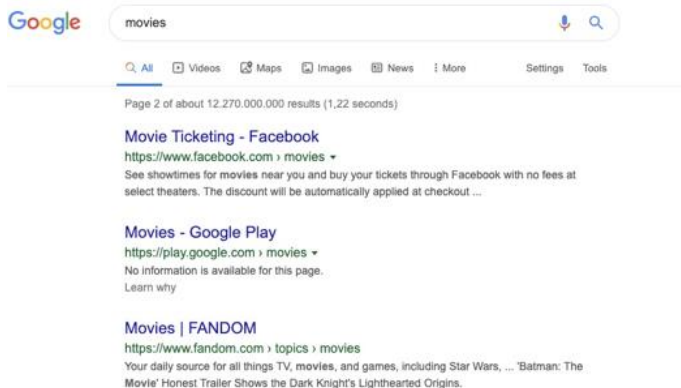
# Before everything else.



# What is Testing?



# How can we test those?

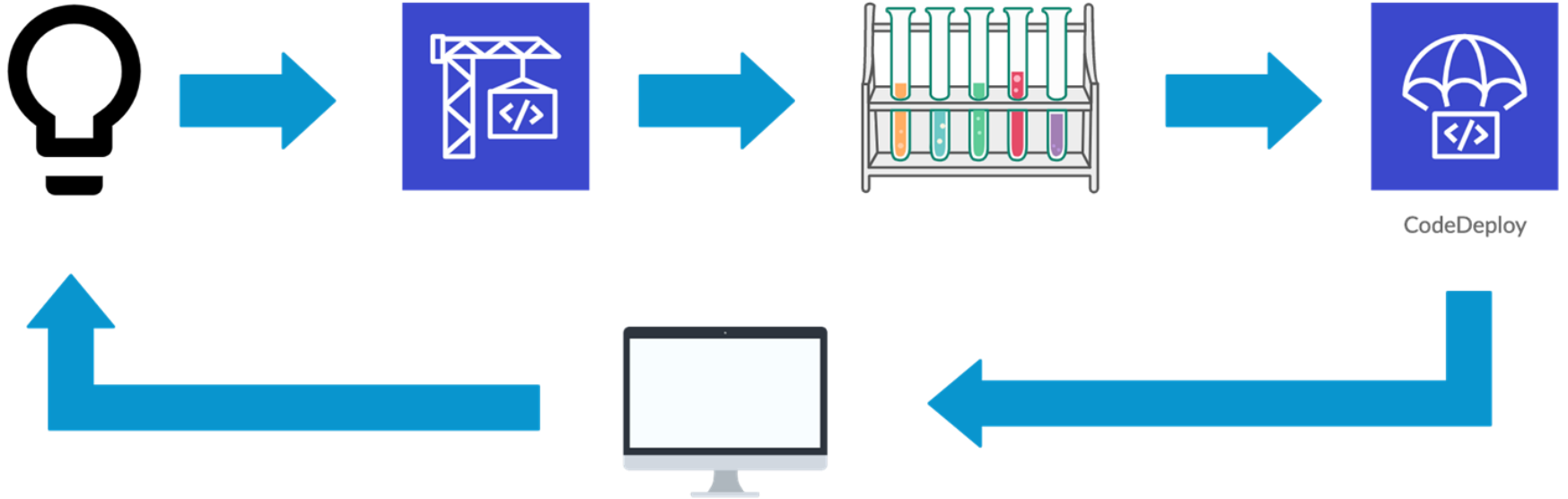


Too expensive

Not possible



# Automation in Quality Engineering.





# Oracle Problem.

Determining the correct output for a given input is known as the oracle problem or test oracle problem, which is a much harder problem than it seems, and involves working with problems related to controllability and observability.

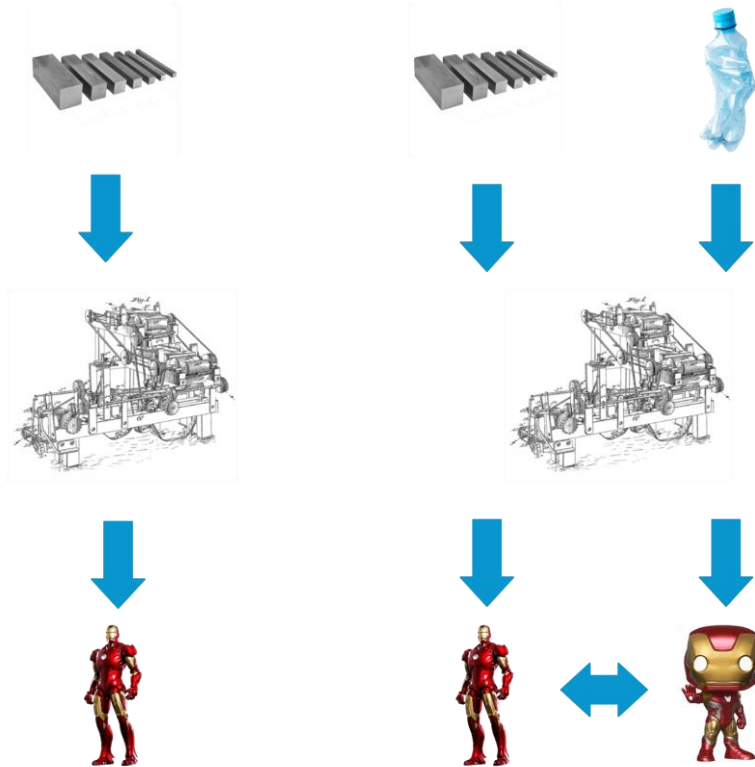
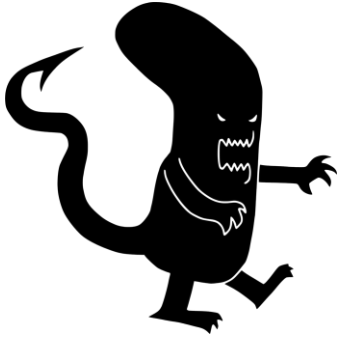
-- [wikipedia.org](https://en.wikipedia.org/wiki/Test_oracle_problem)

A dark, blue-tinted photograph of the Golden Gate Bridge, viewed from a high angle looking down the length of the bridge towards the city of San Francisco in the distance. The bridge's iconic towers and suspension cables are visible, and the water of the bay is a deep blue.

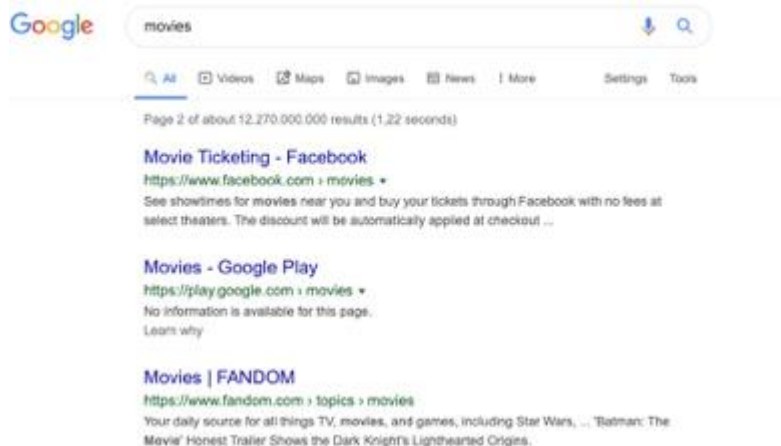
# Metamorphic Testing



# Test a powerful machine.



# A real problem.



Google

movies

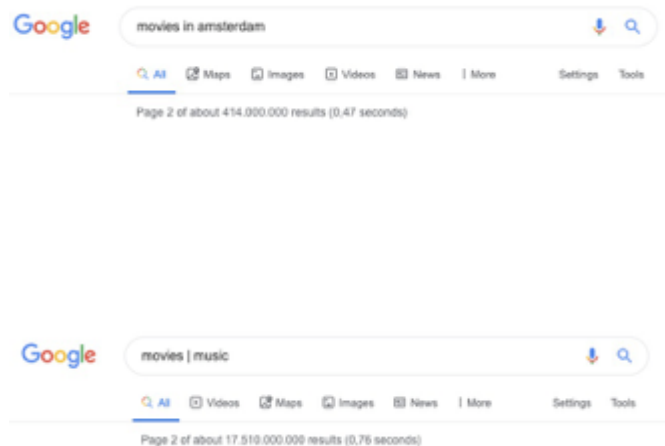
AI Videos Maps Images News More Settings Tools

Page 2 of about 12,270,000,000 results (1,22 seconds)

**Movie Ticketing - Facebook**  
<https://www.facebook.com/movies> •  
See showtimes for movies near you and buy your tickets through Facebook with no fees at select theaters. The discount will be automatically applied at checkout ...

**Movies - Google Play**  
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Page 2 of about 17,510,000,000 results (0,76 seconds)

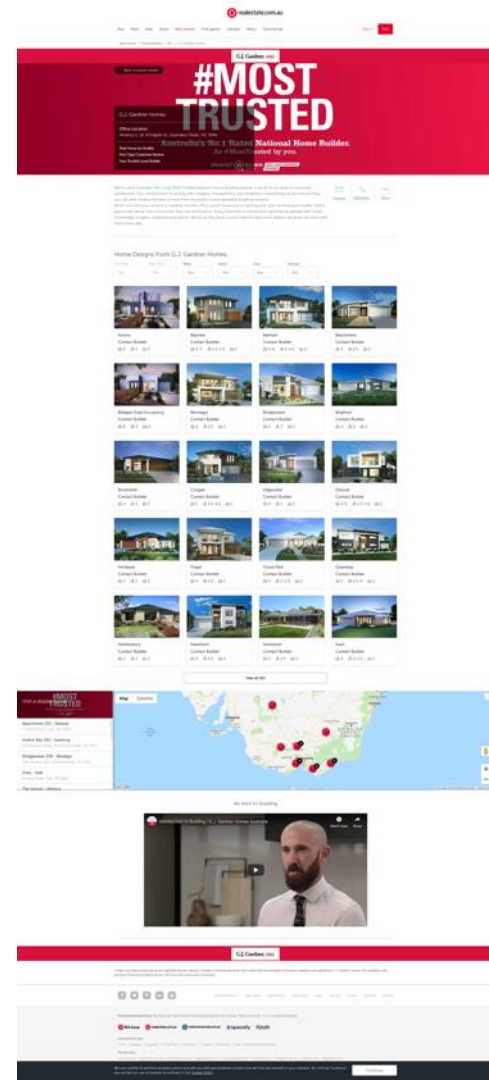
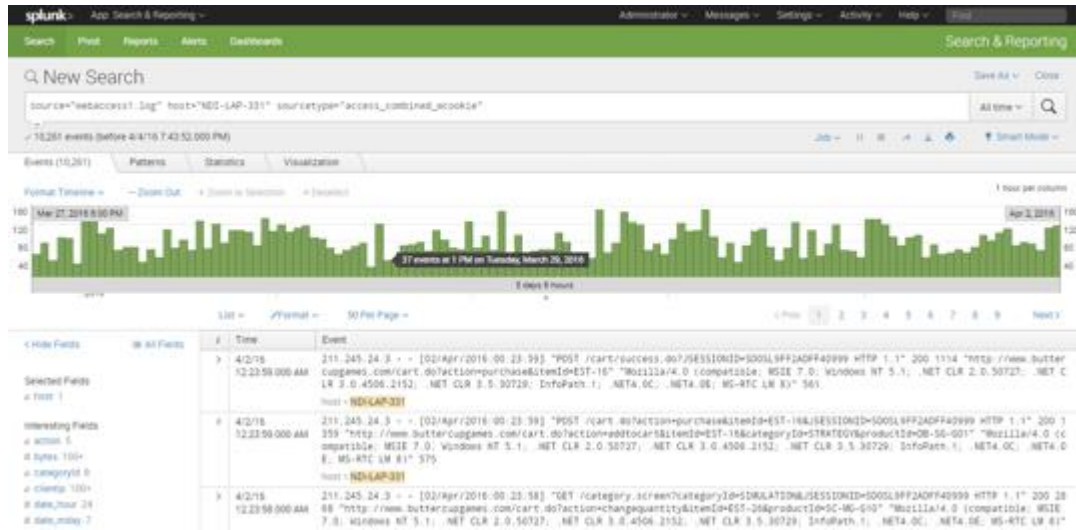
**MT is property based testing and also a  
compromised solution.**

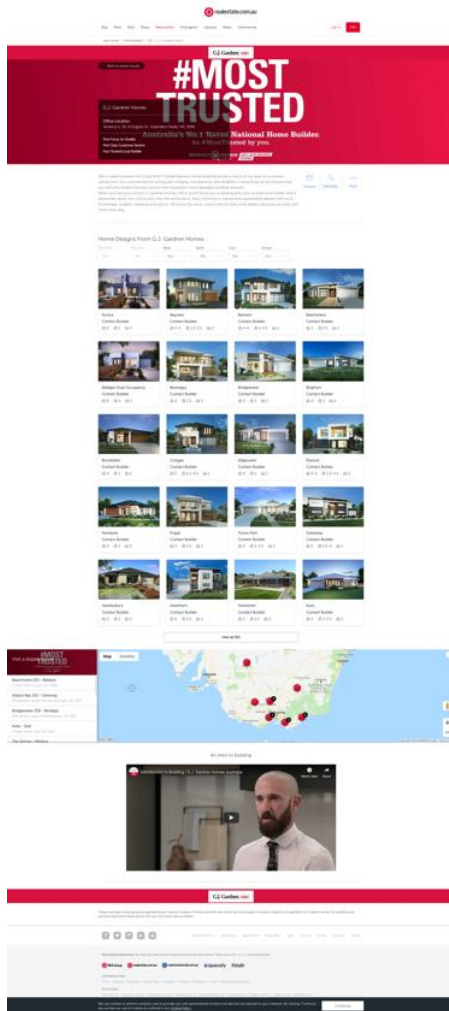


# Case Study: Log Based Auto-verification



# A single page web application.

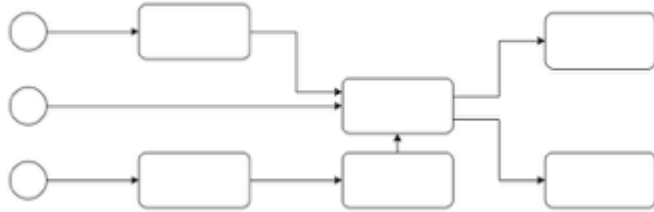




- Two user actions should not be fired within 1 sec
- Sending email should be fired after enquire click
- Share action should be fired after more click
- Zoom in event should be fired when user clicks a display
- Zoom out event should be fired when user clicks all displays

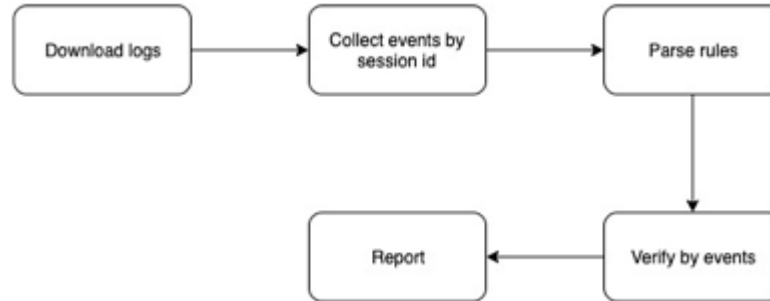


# Auto-detection from Splunk log.



Path Coverage may be unlimit

Process



# Case Study: AI Image Prediction



## Test candidates.



resnet50



InceptionV3



DenseNet121

VO



Resnet50:  
Minivan: 71.34

DenseNet:  
Minivan: 49.27

Inception:  
Minivan: 99.93

# V1 - compressed



Resnet50:  
Minivan: 71.22

DenseNet:  
Minivan: 52.71

Inception:  
Minivan: 99.94



## V2 - mirrored



Resnet50:  
Minivan: 66.11

DenseNet:  
Minivan: 43.09

Inception:  
Minivan: 53.01

## V3 - cropped



Resnet50:  
Minivan: 65.81

DenseNet:  
Minivan: 29.00

Inception:  
cab: 83.52

## V4 - white background



Resnet50:  
Minivan: 59.80

DenseNet:  
garbage\_truck: 13.57

Inception:  
beach\_wagon: 64.82



## V5 - black background



Resnet50:  
Minivan: 71.28

DenseNet:  
television: 7.17

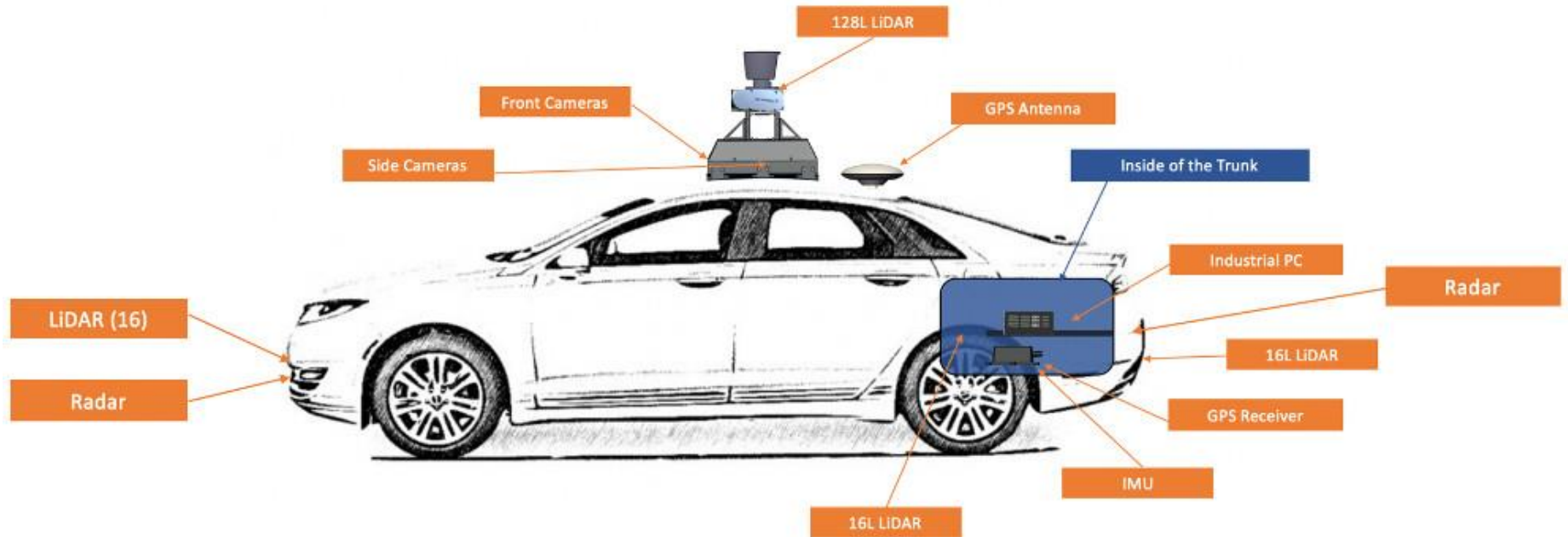
Inception:  
dishwasher: 7.37

## Is that important?

“The system design did not include a consideration for jaywalking pedestrians,” the watchdog stated [PDF] in its write-up. “Instead, the system had initially classified her as an 'other' object which are not assigned goals.”

[https://www.theregister.co.uk/2019/11/06/uber\\_self\\_driving\\_car\\_death/](https://www.theregister.co.uk/2019/11/06/uber_self_driving_car_death/)

# Driverless car system.



# We Are Hiring!!!

[alina.cojanu@booking.com](mailto:alina.cojanu@booking.com)



# Thanks

