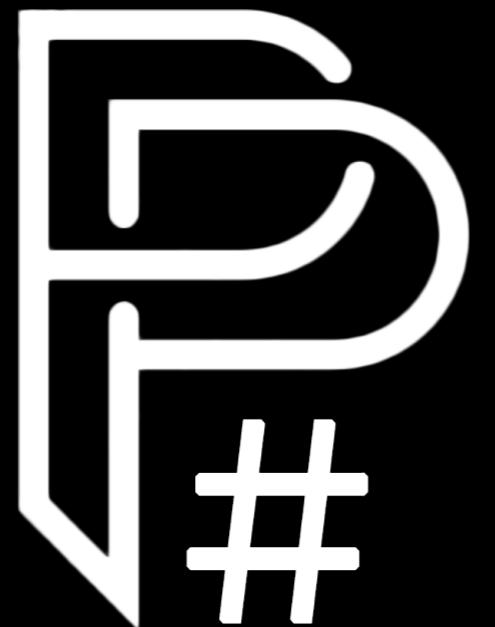


SMART INDIA HACKATHON

WORLD'S BIGGEST HACKATHON



Passionate Programmers

**VISVESVARAYA
NATIONAL INSTITUTE OF TECHNOLOGY**

NAGPUR, MAHARASHTRA

AUTOBOT

GOVERNMENT OF GOA

CATEGORY : SOFTWARE
PROBLEM CODE : #GGA2

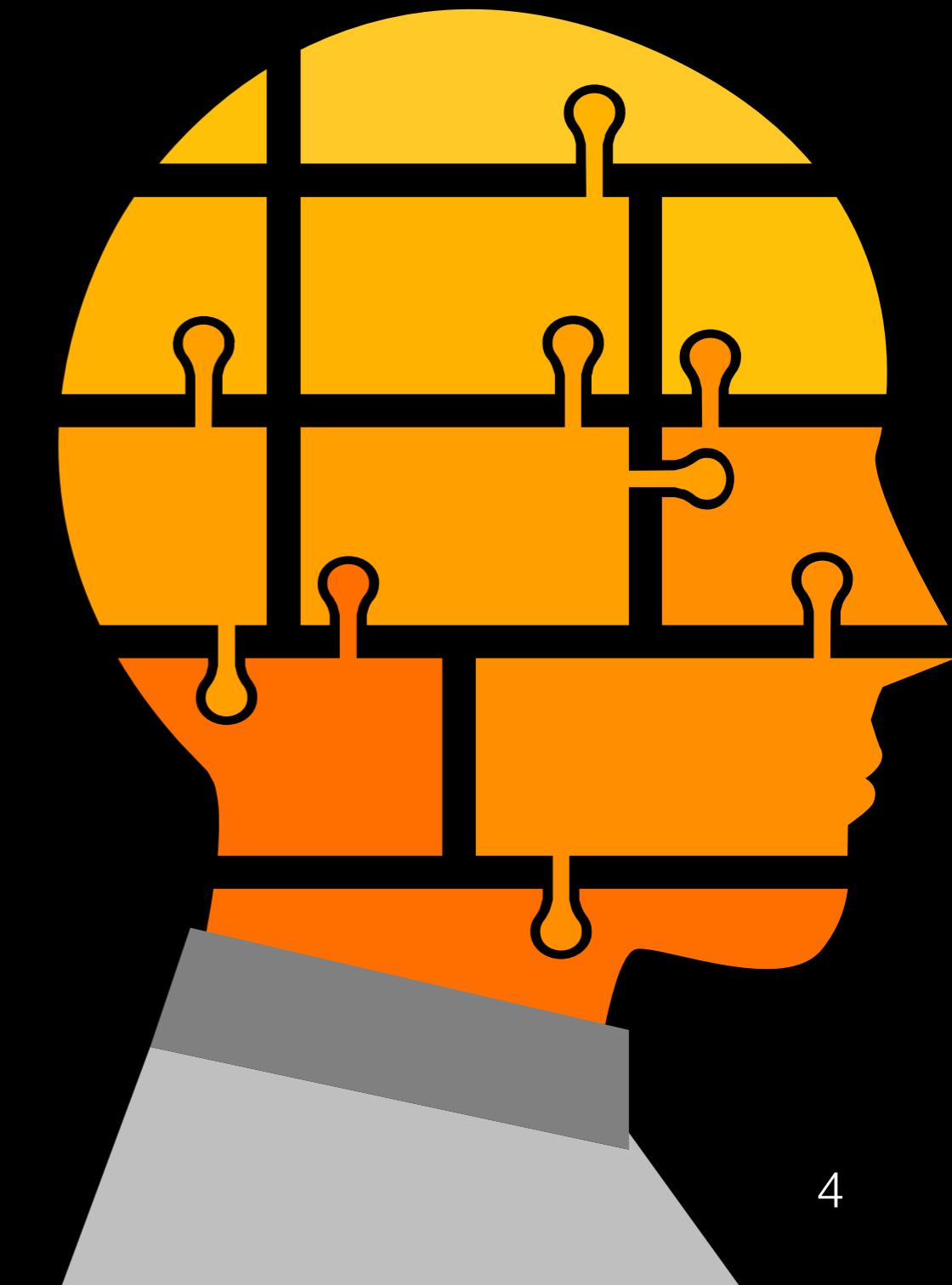
PROBLEM STATEMENT

BACKGROUND

There are many cases wherein the traffic rule violators are not stopped on the scene and most of the times only the vehicle number can be captured.

7 DAYS

It takes for police personnel to manually search the vehicle owner details and **take the notice** to the house of the vehicle owner who violates a rule.



PROBLEM STATEMENT

**Once the notice is served,
the owner/driver has to
visit the Notice branch on
a working day
(within 30days) where the
traffic offence can be
compounded by paying
the mentioned
compounding amount.**



SOLUTION

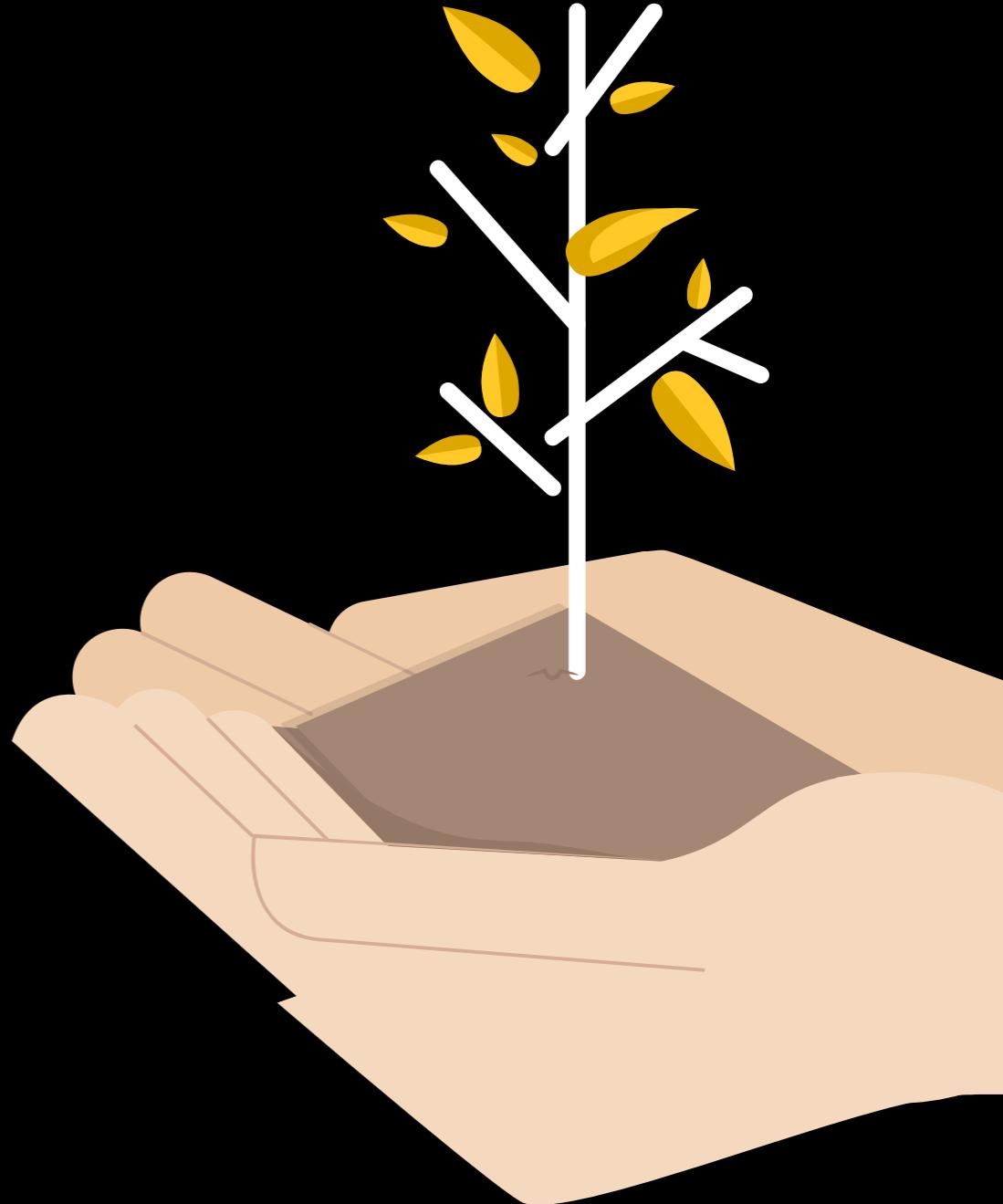
AUTOBOT

A system that can automatically

FIND the valid information, with respect to
the owners of the defaulting vehicles,

SEND the information regarding the
violation (type) through SMS or email and
facilitate

PAYMENT of the compounding amount to
be online.



ADVANTAGES



FASTER AND
SECURE
PAYMENT

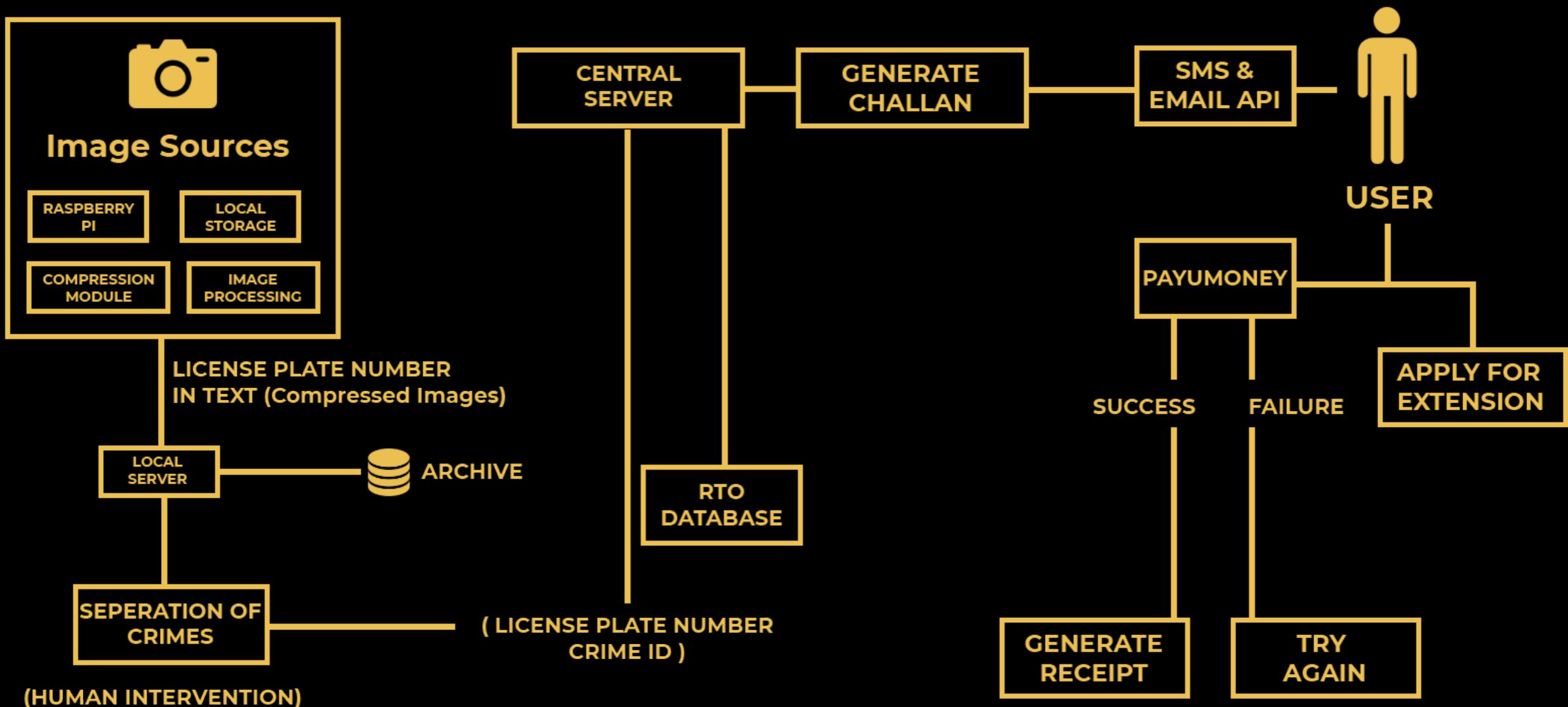


EFFICIENT
VIOLATER
TRACKING



STAY
UP TO DATE

SYSTEM DESIGN



SYSTEM REQUIREMENTS

Typically two nodes with following configuration are required

- For Reporting Server : 32GB RAM, 4-CPU and DISC 100GB
- For Challan Server : 64GB RAM, 8- CPU and DISC 100GB



NON-FUNCTIONAL ASPECTS

PERFORMANCE

- Process transactions per second.
- User/event response time.
- Screen refresh time.

DEPLOYMENT

- On premise
- Cloud

HIGH AVAILABILITY

- 1+N Availability.
- Each site will host two deployments and load will be distributed by load balancers across/within site(s)
- Deployment on geographically separated sites

EASE OF USE

- Training time.
- Number of help frames.

SCALABILITY

- Handle huge traffic in the form for challan request.
- Vertical Scaling
- Horizontal Scaling

FAULT TOLERANCE & ROBUSTNESS

- Monitoring by industry standard tools/frameworks like nagios
- Component Clustering

DEPLOYMENT STRATEGIES

PRIVATE CLOUD

ADVANTAGES

- Dedicated hardware.
- Increased security.
- Flexibility in resource management.
- Load balancing between servers.

DISADVANTAGES

- Cost.
- Scalability issues.
- Under-utilisation of resources in some cases.



DEPLOYMENT STRATEGIES

HYBRID CLOUD

WHY?

- Cost savings.
- Allows balance in keeping non-sensitive data on public cloud and sensitive data on private cloud.

ADVANTAGES

- Fewer outages and less downtime.
- Scalability.

DISADVANTAGES

- Involvement of public and private cloud makes networking complex.

SERVER LOAD AND BANDWIDTH CALCULATIONS

BANDWIDTH CALCULATOR

number of cameras:	<input type="text" value="1"/>
resolution:	<input type="text" value="HD 720p (1280 × 720)"/>
compression:	<input type="text" value="H.264 High - high quality"/>
frame rate (fps):	<input type="text" value="15"/>
storage bandwidth (MB/s):	<input type="text" value="0.1"/>
network bandwidth (Mb/s):	<input type="text" value="1"/>
calculate	

H.264

Storage (MB/s) - 0.1
Network (MB/s) - 1

BANDWIDTH CALCULATOR

number of cameras:	<input type="text" value="1"/>
resolution:	<input type="text" value="HD 720p (1280 × 720)"/>
compression:	<input type="text" value="MPEG4 - high quality"/>
frame rate (fps):	<input type="text" value="15"/>
storage bandwidth (MB/s):	<input type="text" value="0.3"/>
network bandwidth (Mb/s):	<input type="text" value="2.7"/>
calculate	

MPEG4

Storage (MB/s) - 0.3
Network (Mb/s) - 2.7

For one second video

$$720 \times 480 \text{ pixels} \times 1 \text{ bit per pixel} \times 15 \text{ fps} / (1024 \times 1024) = 0.617 \text{ MBps}$$

Compressed images are sent on the channel to control server.

CURRENT GUIDELINES REGARDING INDIAN GOVERNMENT WEBSITES USING CLOUD SERVICES

MeitY has announced **MEGHRAJ POLICY** to realise a comprehensive vision of a government cloud (GI Cloud)

Contractual Issues in Cloud Procurement

Information Security

- Certification/Compliance.
- Privacy and security safeguards..
- Confidentiality.
- Location of Data.
- E-Discovery.
- Law enforcement request.

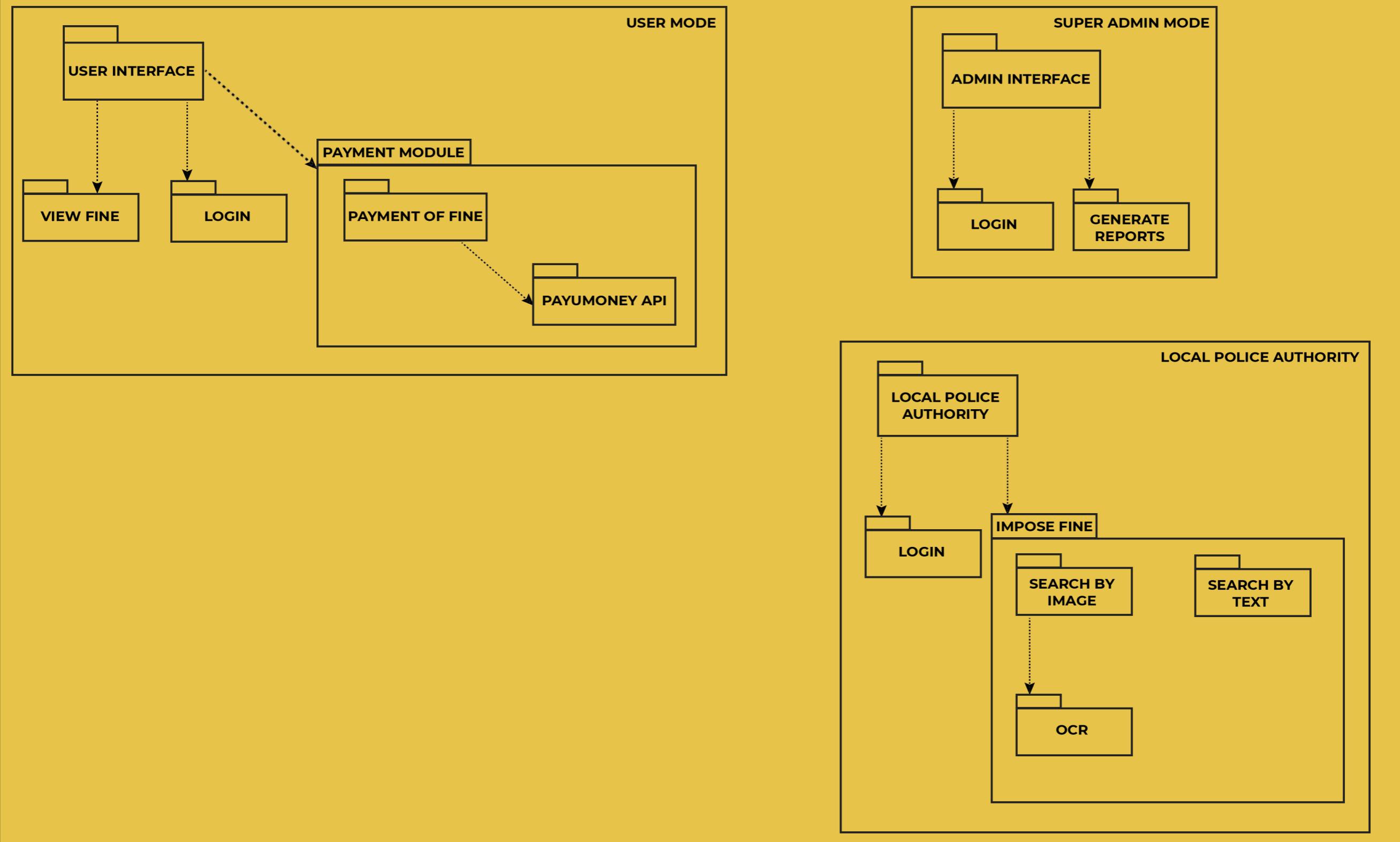


source : http://meity.gov.in/writereaddata/files/Guidelines-Contractual_Terms.pdf

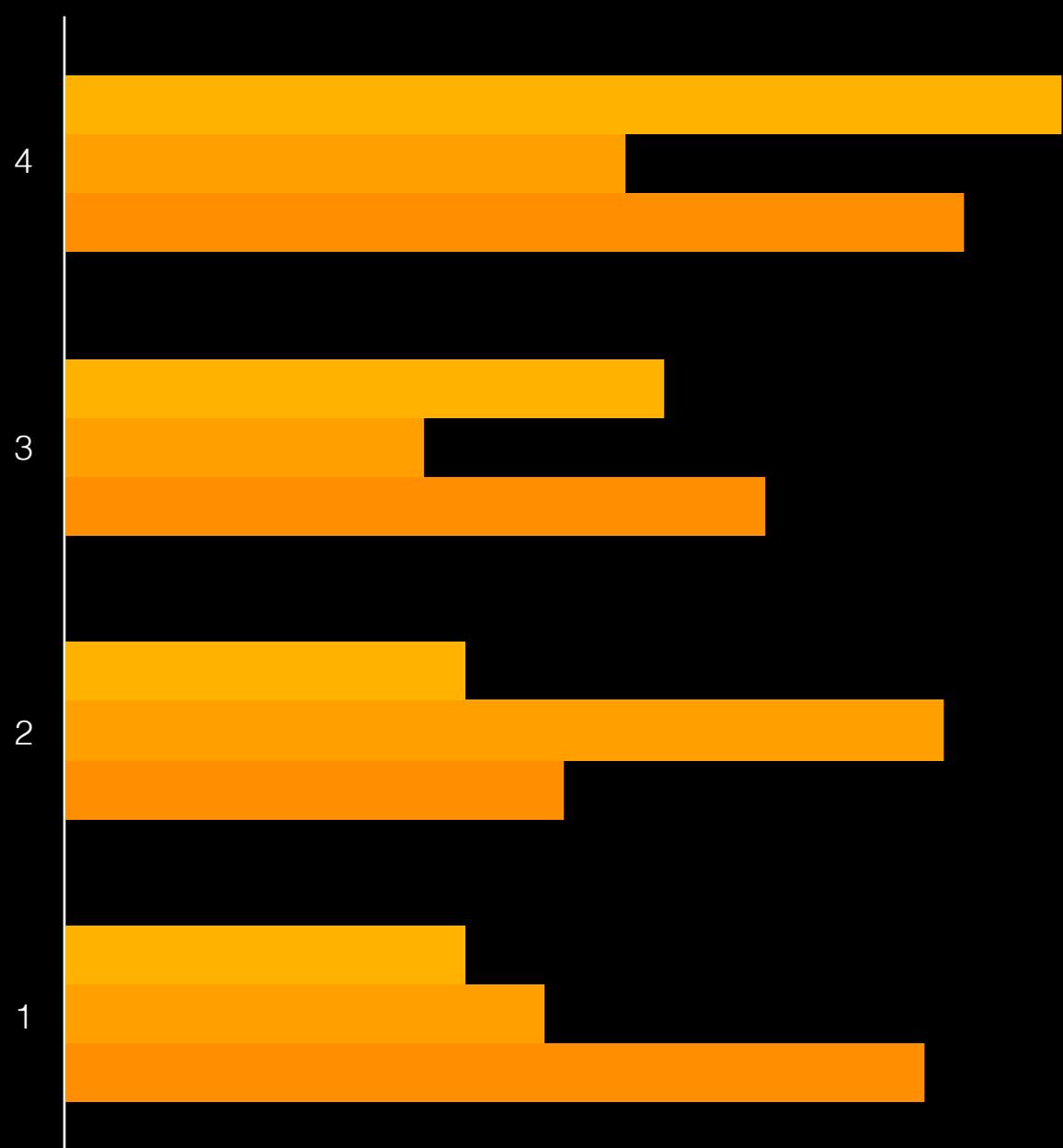
MODULE DIAGRAM



AUTO NOTICE BOT



ADDITIONAL FEATURES



STATISTICAL REPORTS

- Reports can be generated weekly monthly and yearly.

According to :

- Type of offense
- Type of vehicle
- Region

- Total revenue generated from the fines can be obtained.

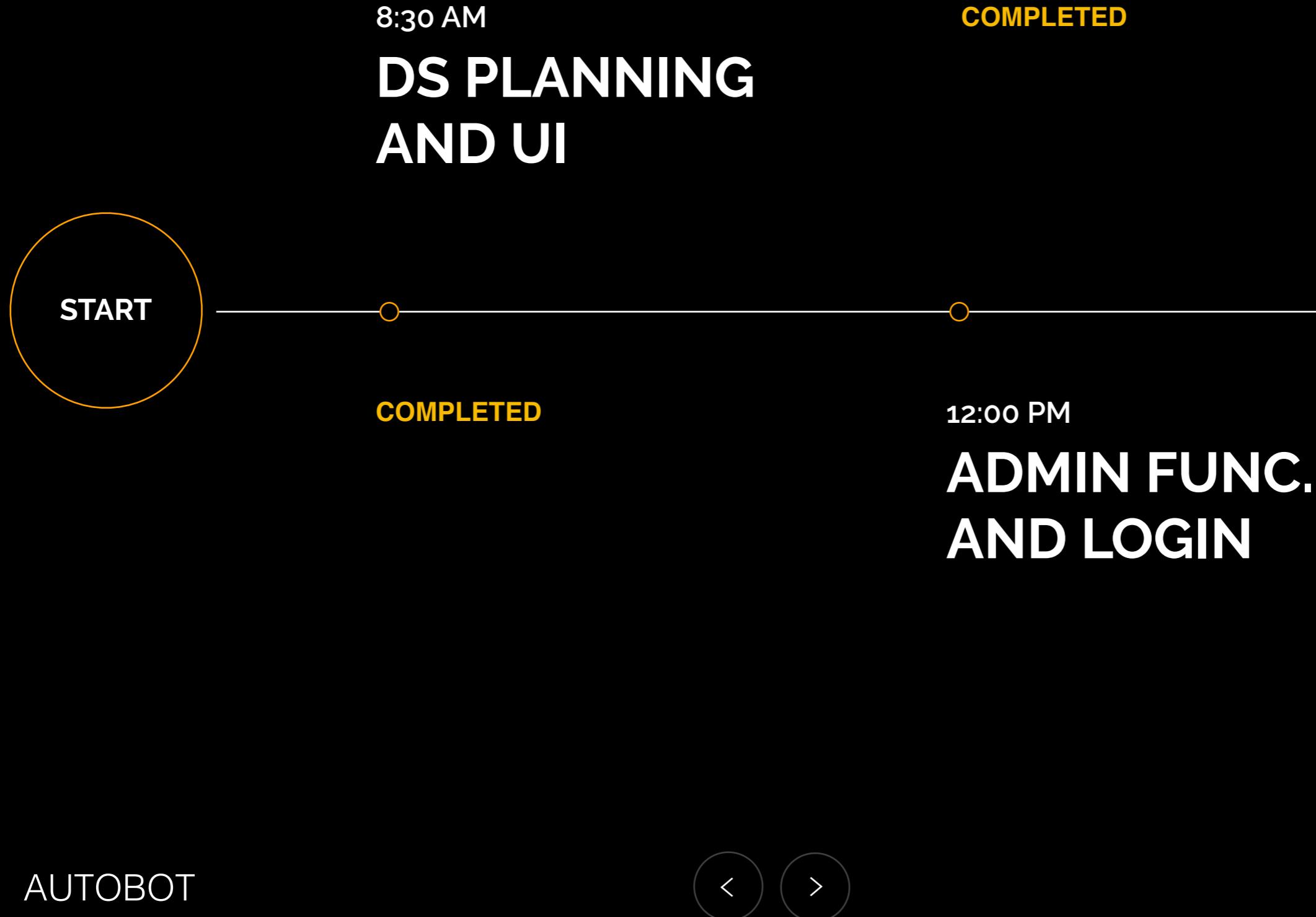
- Comparison of previous year data

EXAMPLE

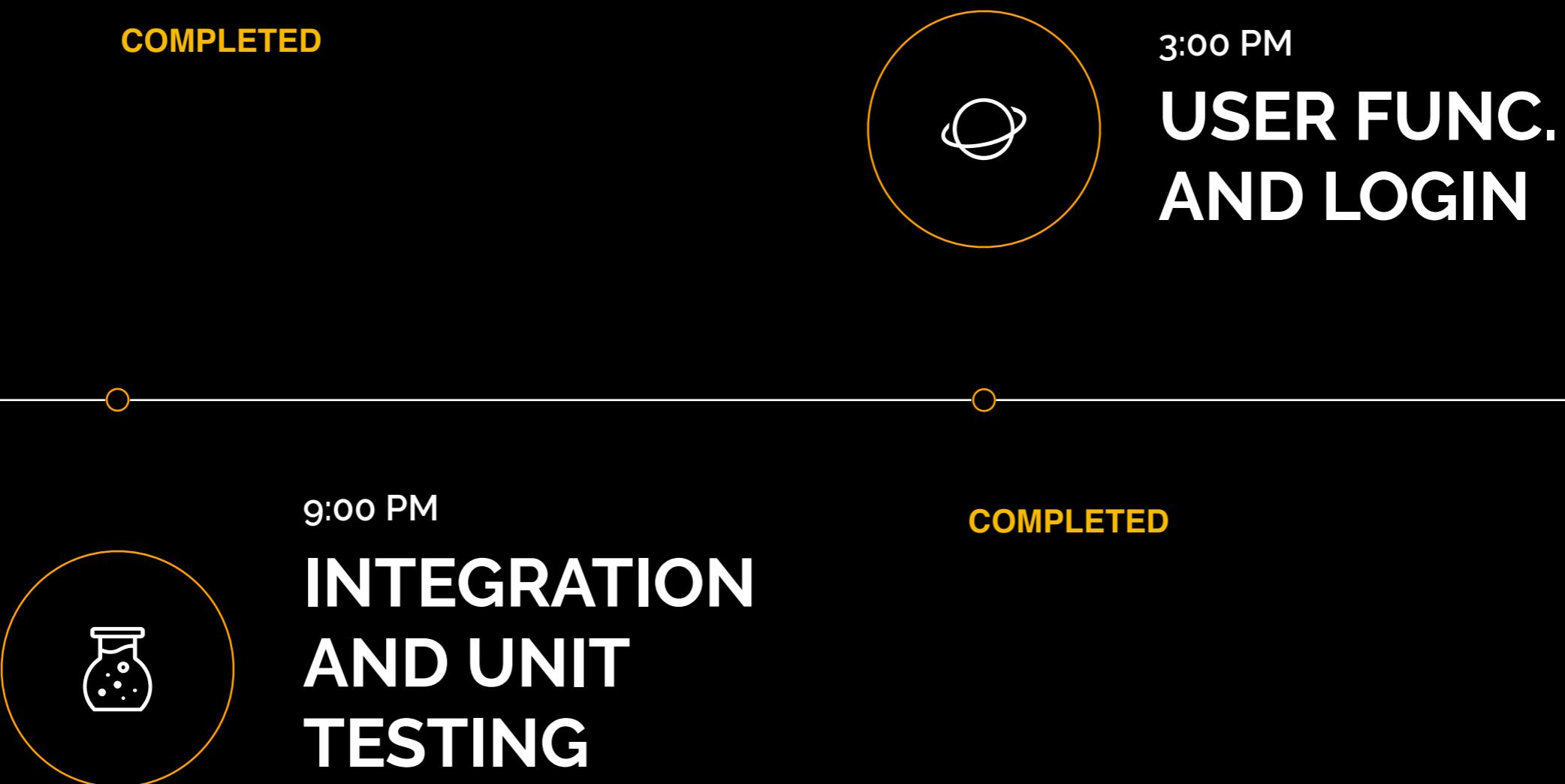


The data indicates rise in case of over-speeding and driving under influence so the Government can take measures to procure more speed guns, breath analyser, clamps etc.

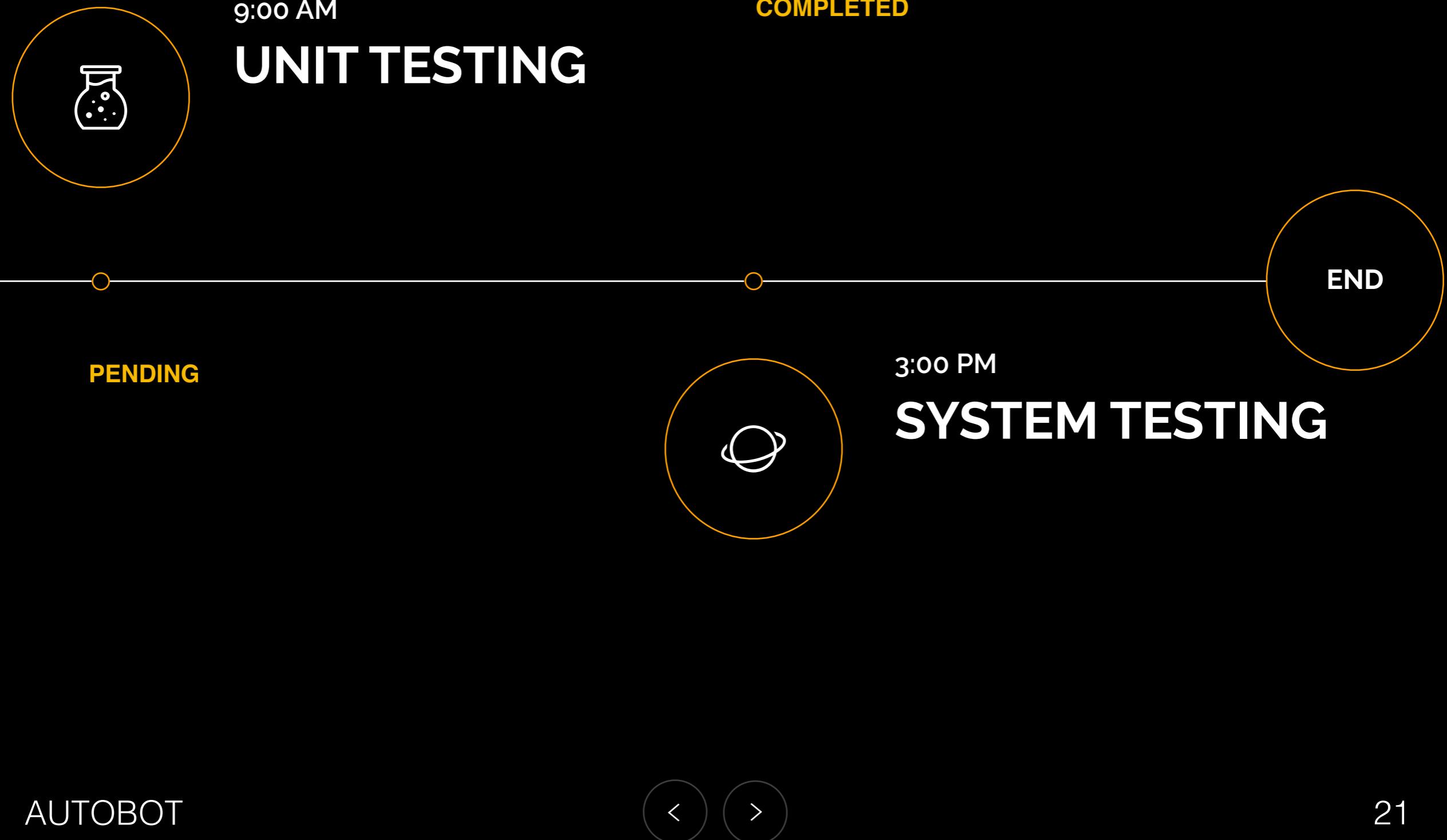
TIMELINE



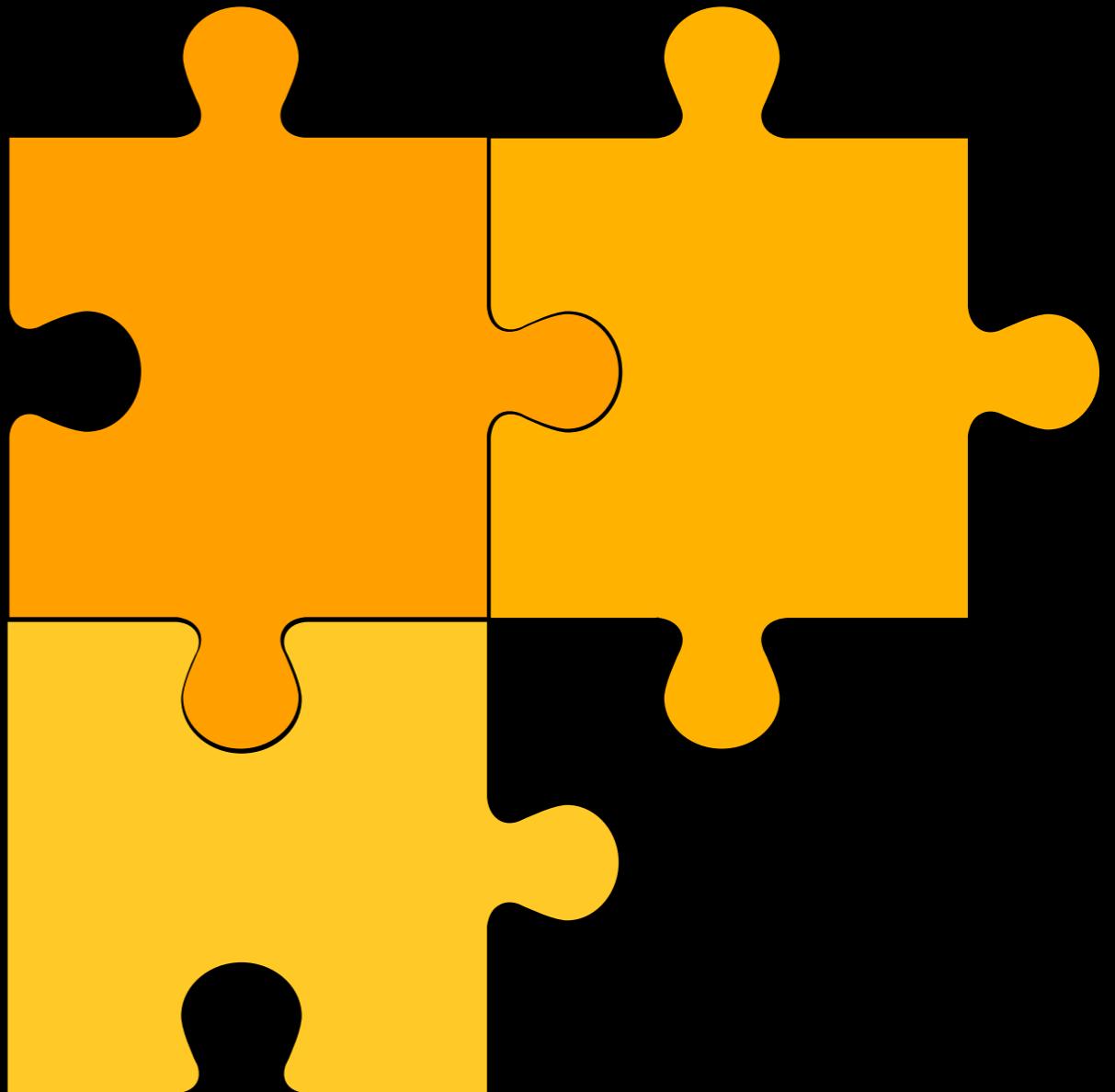
TIMELINE



TIMELINE



FRAMEWORKS, APIs AND DATABASE



FRAMEWORKS



DJANGO

MATERIALIZECSS

WHY?

- Highly Scalable.
- Versatile - Support for external libraries.
- Ease of deployment.

WHY?

- Responsive
- Light weight framework
- Compatibility

APIs AND EXTERNAL LIBRARIES



**PAYUMONEY
PAYMENT API**

WHY?

- Hassle free and easy set-up.
- Minimal efforts in integration.
- Lowest transaction rate and the fastest settlement period.

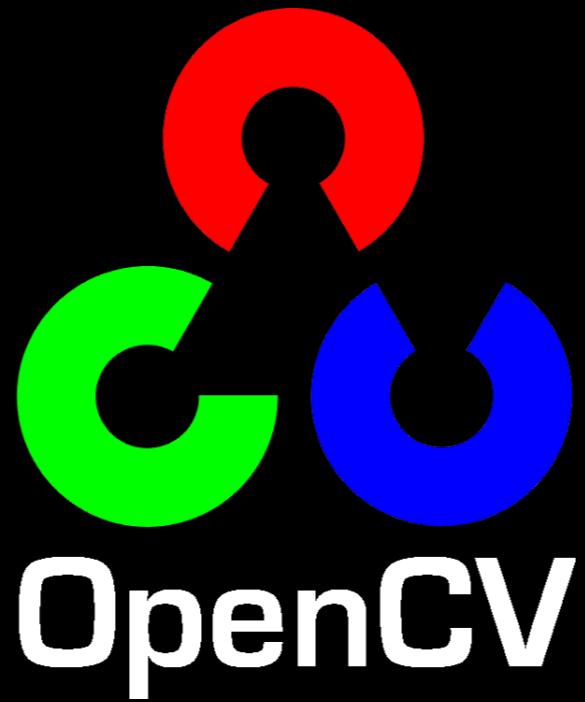


**PYTESSERACT
OCR TOOL
FOR PYTHON**

WHY?

- Open source and free.
- Supports various image formats.
- Highly compatible with Django.

IMAGE PROCESSING TECHNOLOGY



WHY?

- Free of cost software (Open Source)
- Compatible with Django
- Portable - can run on any device that can run C.

MACHINE LEARNING TECHNOLOGY



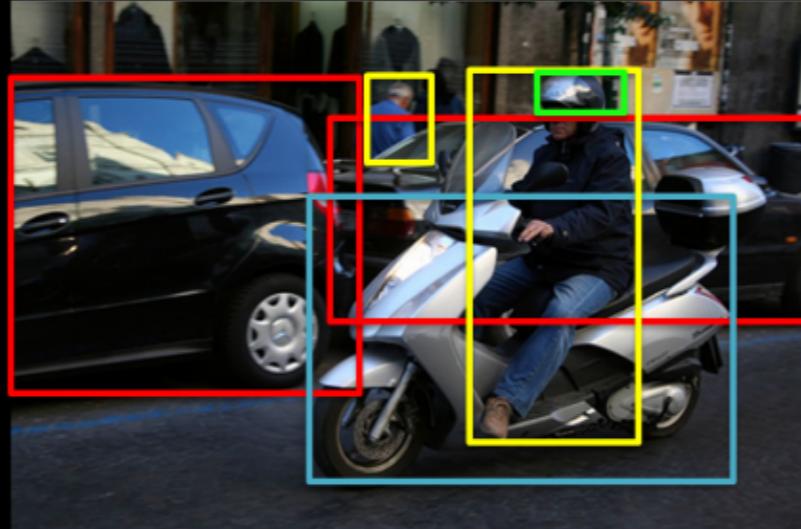
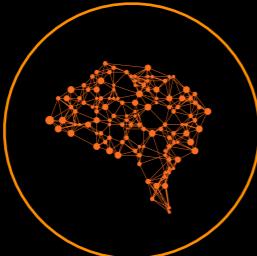
TensorFlow

WHY?

- Large scale machine learning process can be handled
- Clear and precise computational graph visualisation.
- Highly documented and one of the leading machine learning technologies.

ELABORATION ON MACHINE LEARNING TECHNIQUES

DEEP LEARNING



Person
Car
Motorcycle
Helmet



TRAINING CONVOLUTIONAL NEURAL NETWORKS

POPULAR MODULES

Google Cloud Vision API - Understand the content of an image by encapsulating powerful machine learning modules.

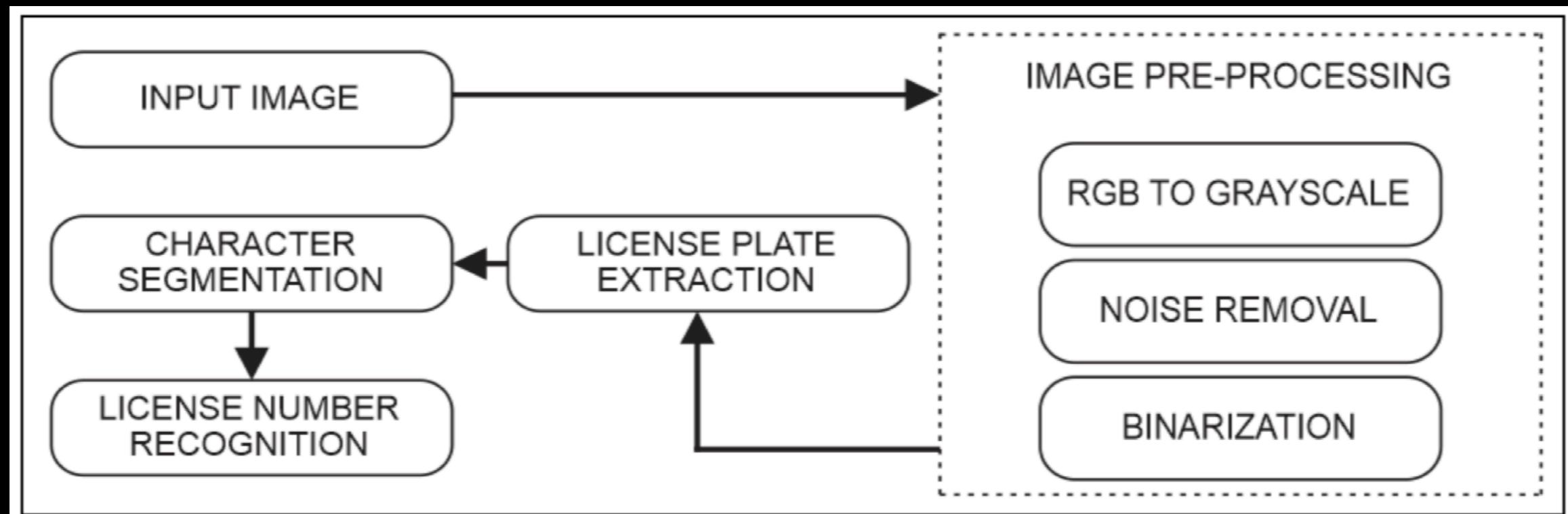
Cloud AUTOML - Suite of machine learning products to train high quality models which includes Neural Architecture Search Technology

AutoML VISION HAS ACHIEVED **94.5%** ACCURACY

AUTOBOT

CONVOLUTIONAL NEURAL NETWORKS

Proposed System



CONVOLUTIONAL NEURAL NETWORKS



ACQUIRED INPUT IMAGE



RGB TO GRayscale CONVERSION



IMAGE WITH NOISE

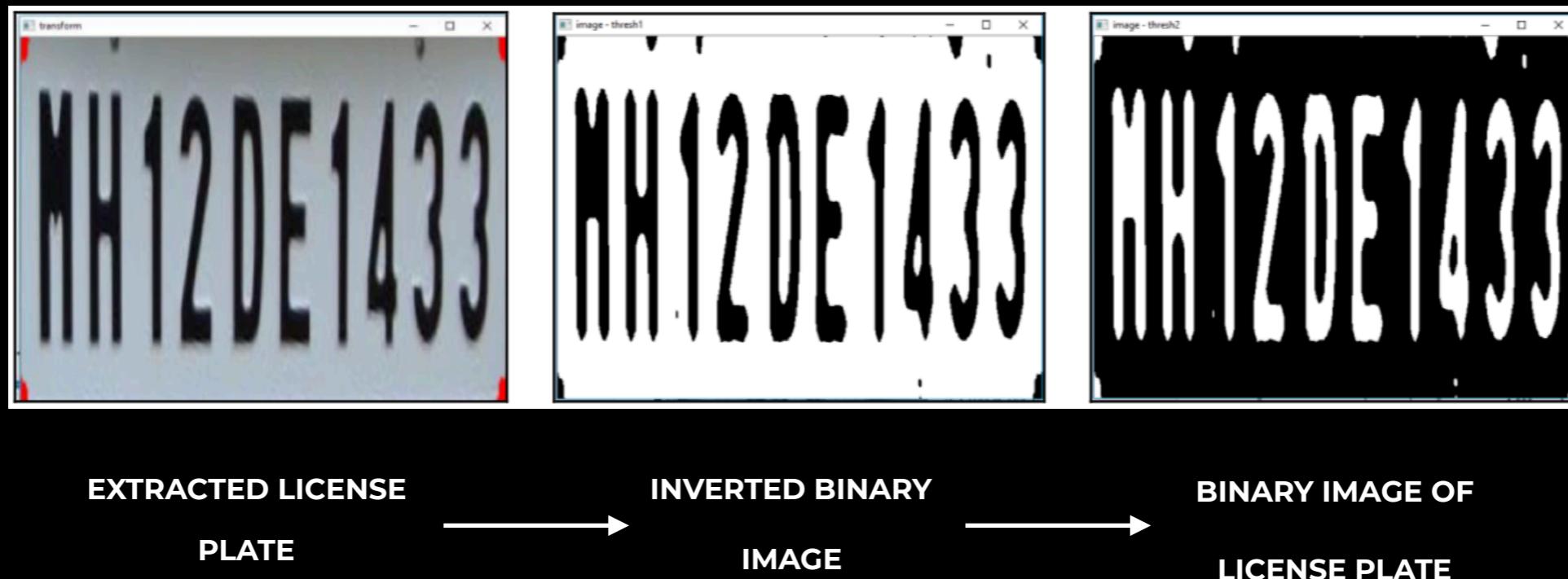


IMAGE WITH REDUCED NOISE

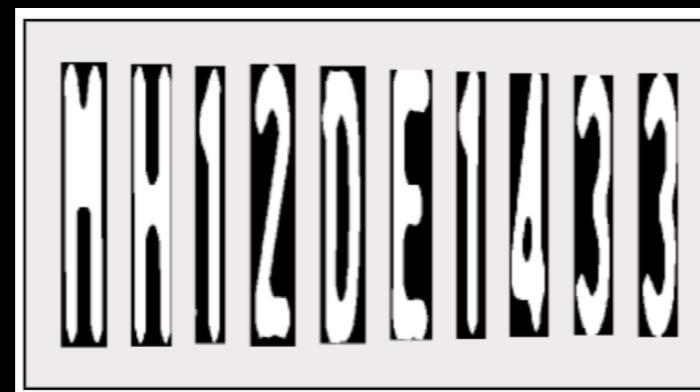
AUTOBOT

CONVOLUTIONAL NEURAL NETWORKS

BINARIZATION



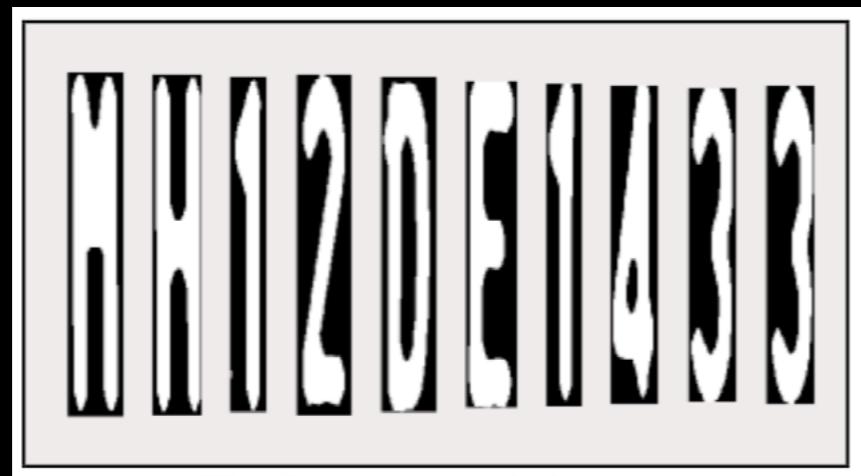
CHARACTER SEGMENTATION



AUTOBOT

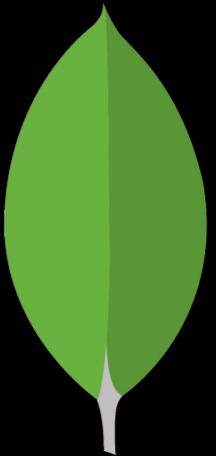
CONVOLUTIONAL NEURAL NETWORKS

CHARACTER RECOGNITION USING CONVOLUTIONAL NEURAL NETWORK



MH 12 DE 1433

DATABASE



mongoDB

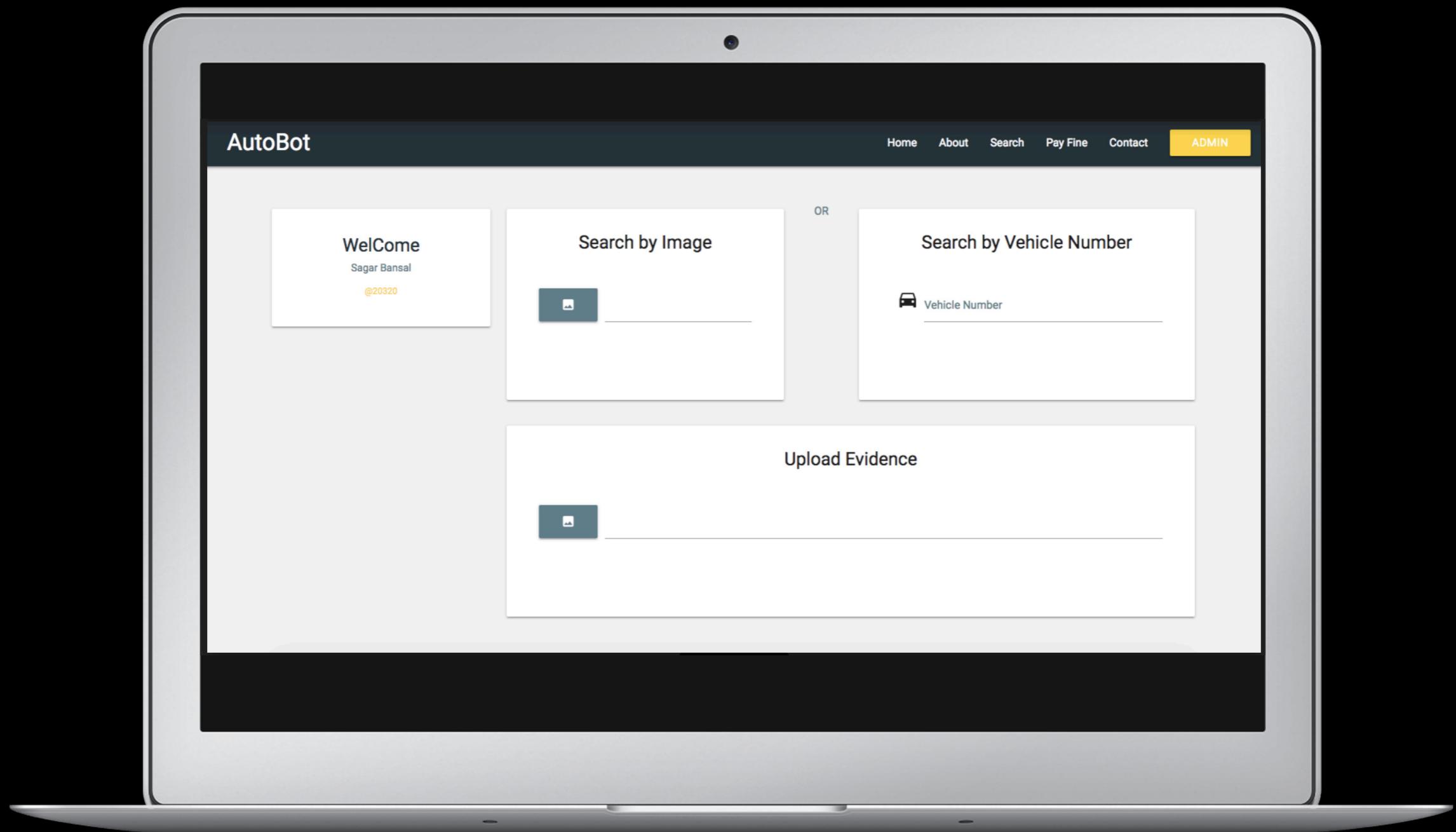
mongo DB

WHY?

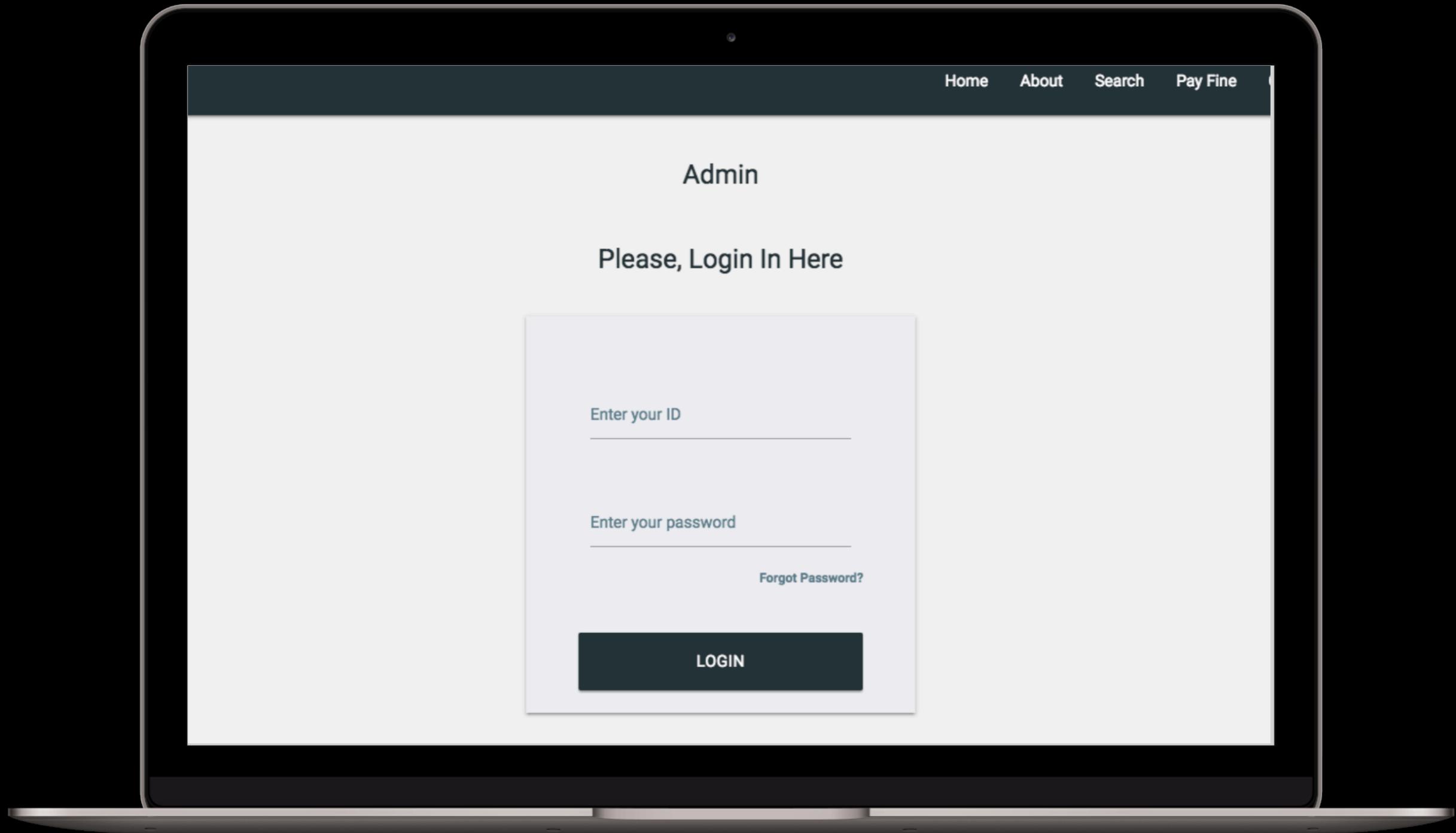
- Highly Scalable
- Schema less

THE PLATFORM

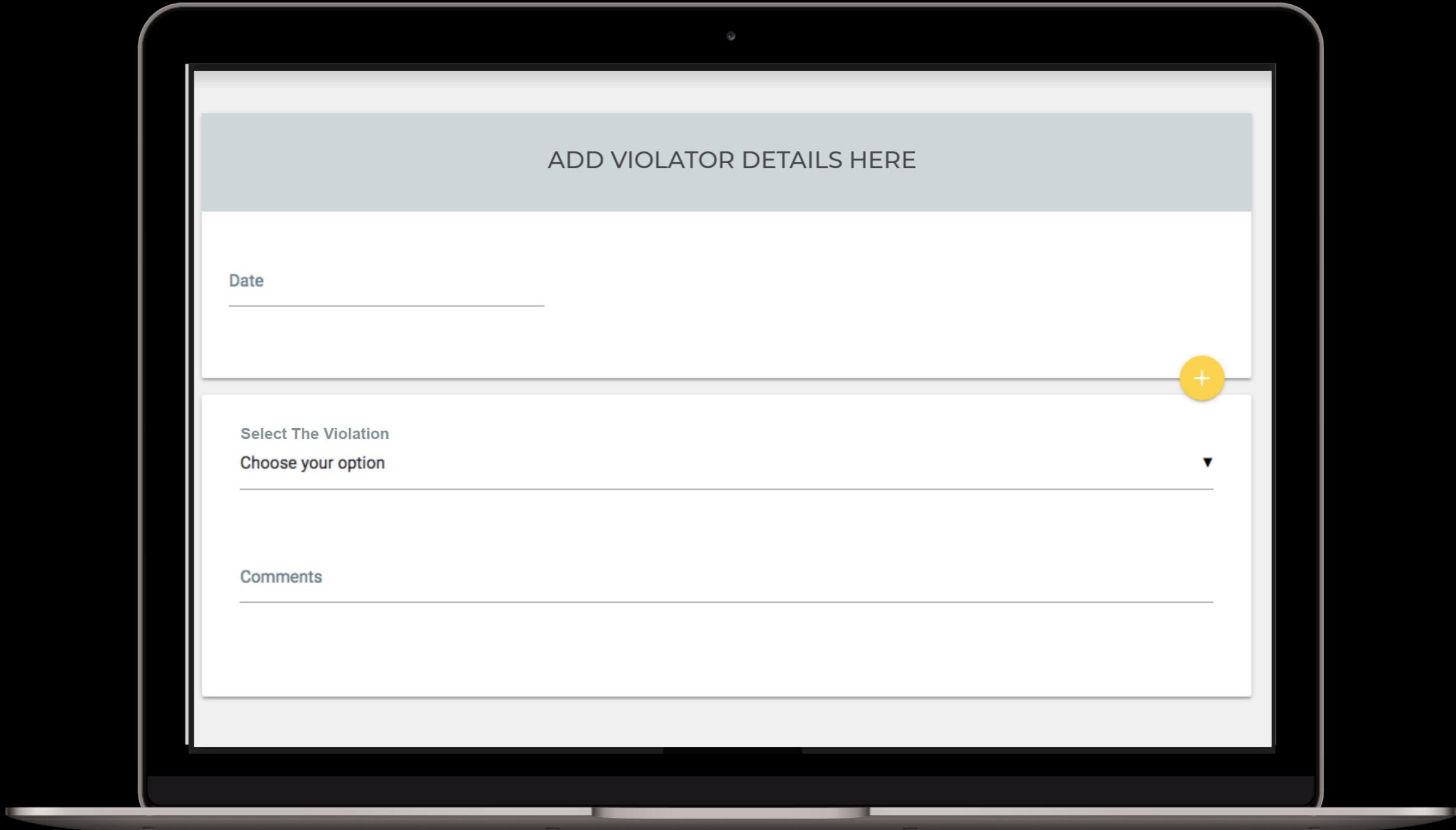
ADMIN DASHBOARD



LOGIN



VIOLATION DETAILS



MAJOR OFFENSES

Seat belts not fastened

Rough/Rash driving

Driving against one way

Tripling

Violation of Mandatory signs

Driving against police signal

Over-speeding

Use of mobile phone

Use of tinted glass

Overloading

Driving without helmet

Jumping Signal

Overtaking perilously

Pollution not under control

LIMITATIONS AND FUTURE PROSPECTS



Limitations

- Accuracy of OCR (Open Source)
- Quality of image.
- Older relevant images stored on server might take too much space on the cloud.

Future Prospect

- Improved accuracy can be achieved using Image Processing Techniques.
- Use of **Machine Learning** and **Artificial Intelligence** to determine correctness of number plate.
- Older relevant images can be archived off the cloud.

LIMITATIONS AND FUTURE PROSPECTS 2

LPR Camera vs Regular Camera



Use of License Plate Recognition Camera to detect number plate even in low light.

www.cctvcamerapros.com/LPR

For remote areas or in cases where image capturing devices are not available, the local police authority can note the offender's license plate number and manually enter it later to avail the service.

LIMITATIONS AND FUTURE PROSPECTS 3



POLLUTION UNDER CONTROL (PUC)

The Union ministry of road and transport has issued a draft notification on 09 March 2018, for linking Pollution Under Control (**PUC**) certificates of vehicles with a central database of vehicles VAHAN.

As a future prospect, using the database of VAHAN we can generate a list of vehicles who need to issue/renew their PUCs to avoid violation.

THE TEAM

TEAM MEMBERS - AUTOBOT



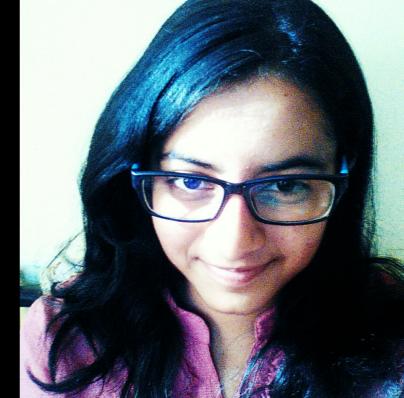
PRIYANK

2ND YEAR, CIVIL



SAGAR

2ND YEAR, METALLURGY



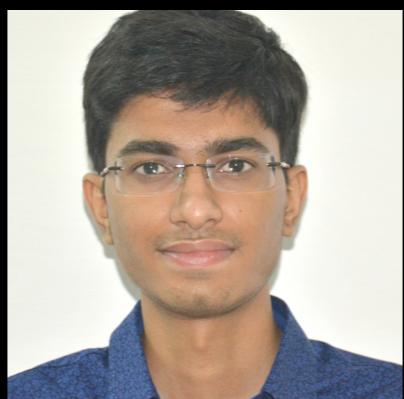
ANUSHREE

3RD YEAR, CSE



VIPUL

3RD YEAR, MINING



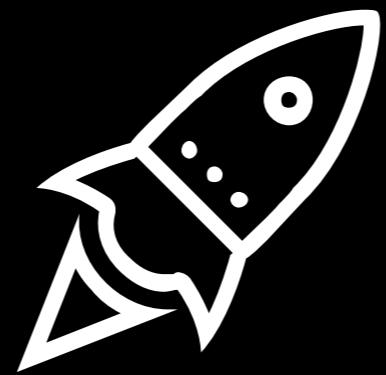
AYUSH

2ND YEAR, CSE



SNIGDHA

2ND YEAR, CSE



THANK YOU

QUESTIONS?