# KOKTAL PROJECT:

## Incidents prevention system using ML algorithms and Blockchain Technology

By Sigma LABS

# OUR STORY

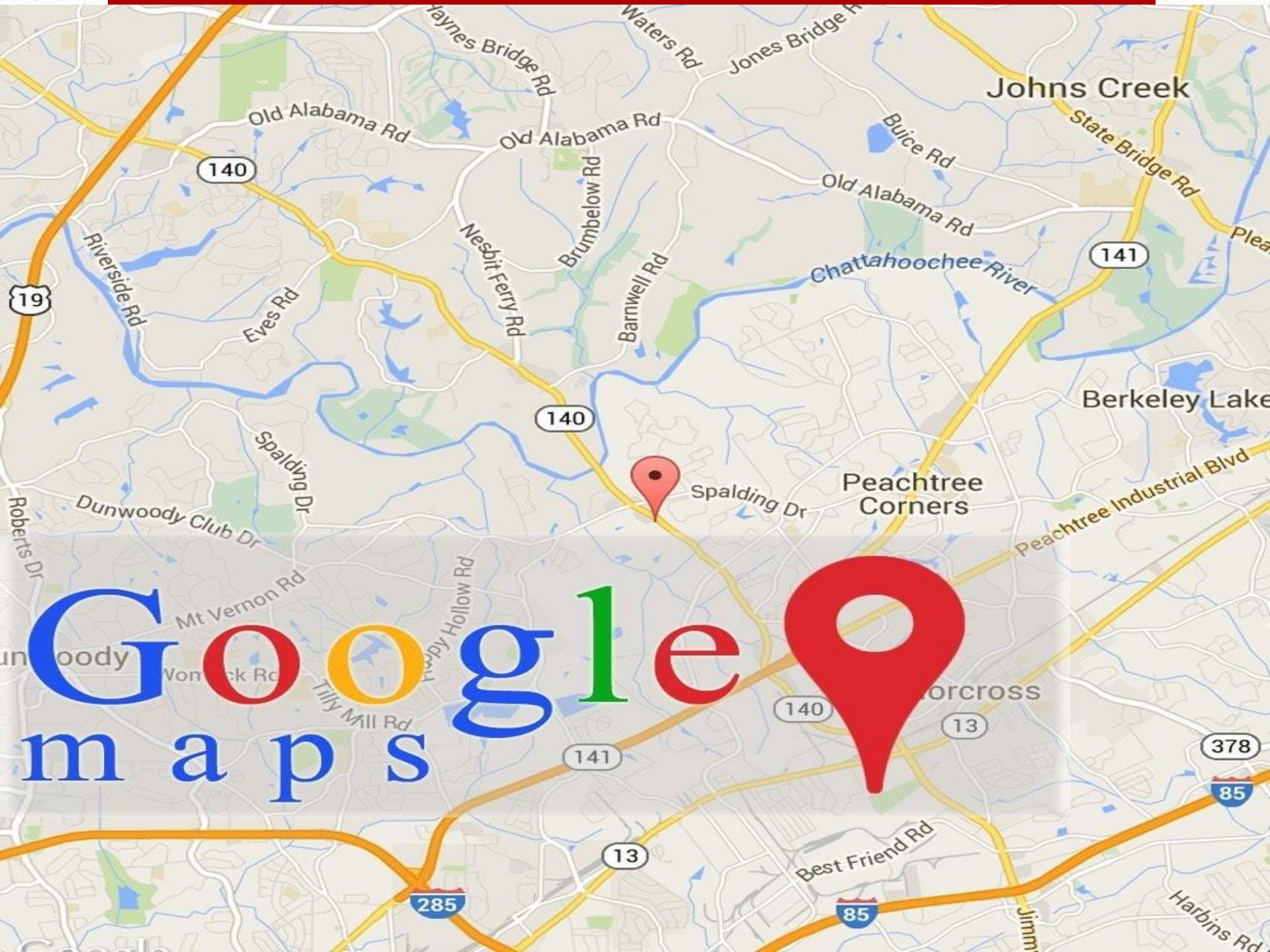
This project is a part of an international project fulfilled in collaboration with mentors from Mountain View and scientists from University of Central Florida. We want to implement it in Kazakhstan.

# AIM

To create a DI (decentralized intelligent) system based on ML algorithms and Blockchain Technology which will prevent citizens from incidents.

# OBJECTIVES

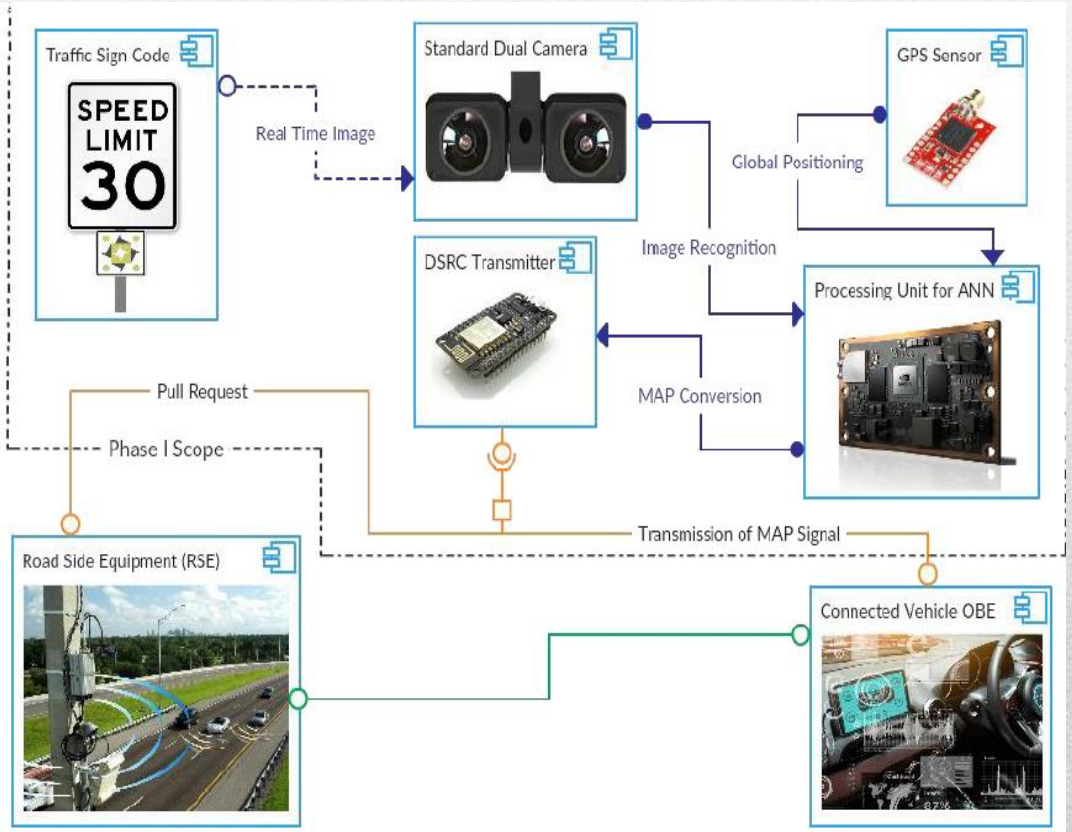
- Create Koktal DI glasses (Decentralized Intelligent glasses).
- Create DI (decentralized intelligent) mobile application for vehicles
- Create DI database both for private-sector and emergency agencies (police, ambulance etc…)


Haynes Bridge Rd
Waters Rd
Jones Bridge Rd
Johns Creek
Old Alabama Rd
Old Alabama Rd
Buice Rd
State Bridge Rd
140
Old Alabama Rd
Brumbelow Rd
Nesbit Ferry Rd
Barnwell Rd
Chattahoochee River
141
19
Riverside Rd
Eves Rd
Berkeley Lake
140
Spalding Dr
Spalding Dr
Peachtree Corners
Peachtree Industrial Blvd
Dunwoody Club Dr
Roberts Dr
Mt Vernon Rd
Tilly Mill Rd
Google
maps
140
13
141
378
85
13
285
85
Best Friend Rd
Harbins Rd

# PROBLEM STATEMENT

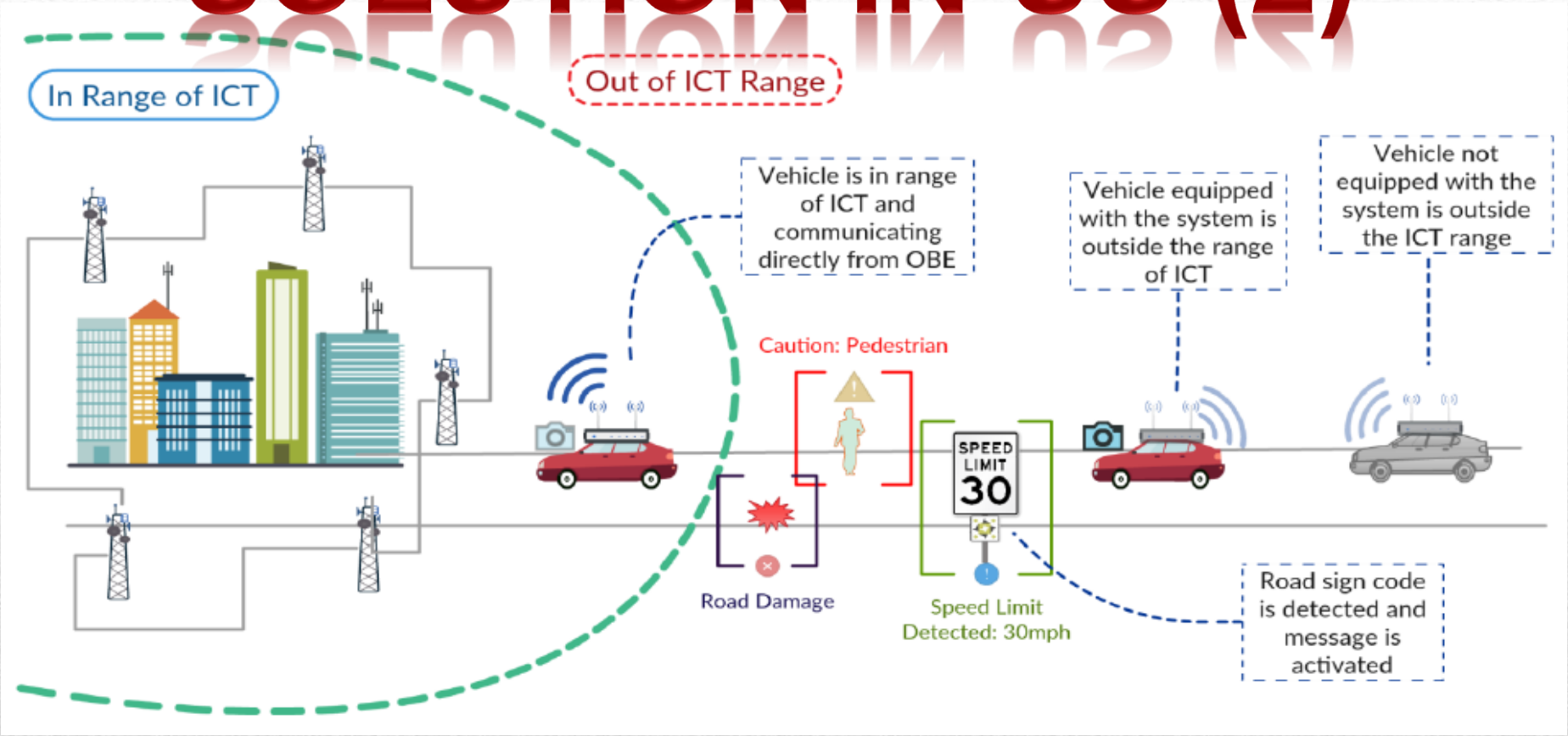
- Web mapping services such as Google maps, 2GIS, Yandex Maps and others don't provide information about the road and side road incidences, like road damages, fire, fallen trees and etc.
- Information can be hacked, therefore information security must be provided

# SOLUTION IN US (1)




- positioning sensor and transmitter can convey important roadway information such as operational messages, basic safety messages, warning to the driver when travelling outside of ICT infrastructure range.

# SOLUTION IN US (2)




# HOW IT WORKS?


# The smart vision device for V2I support was tested under wide range of environmental conditions to prove system's feasibility.

# Koktal vs V2I project (US)

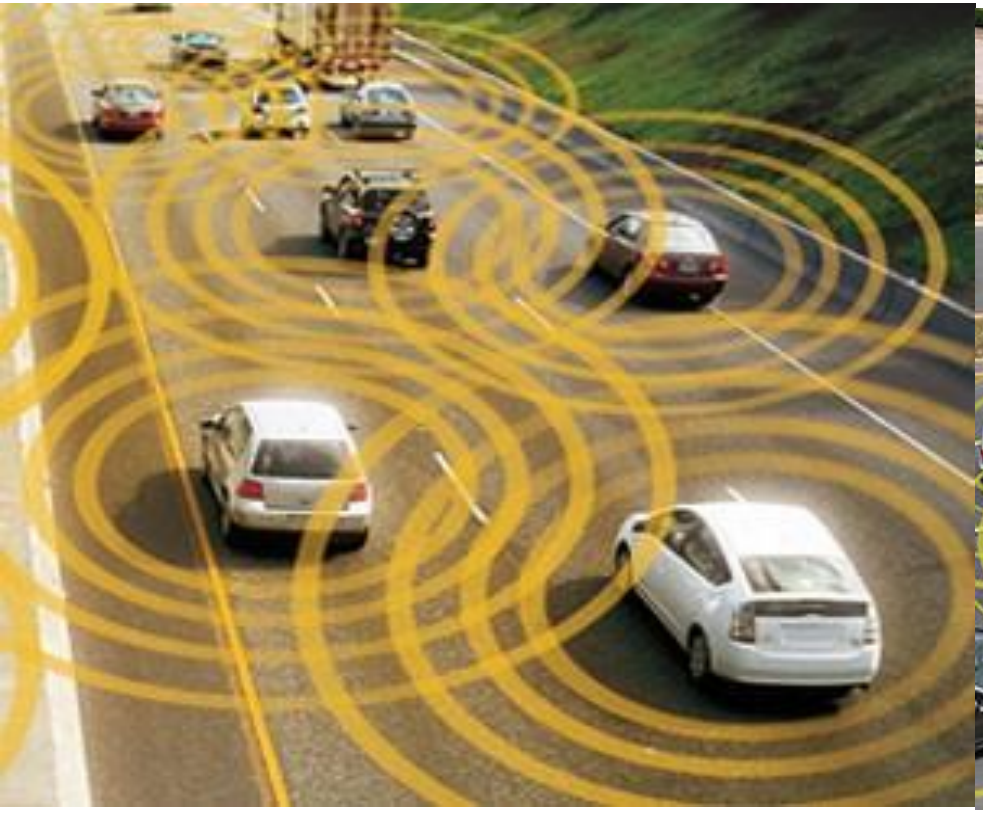
| No | Component Name | Component Description | Market Price |
|---|---|---|---|
| 1 | NVIDIA Jetson TX2 Module  | This GPU board manufactured by NVIDIA operates the deep learning (ANN) applications at very high efficiency | $500 ~ $700 |
| 2 | Dual-Camera (Standard Res.)  | Standard dual camera is attached to the device. Two cameras are necessary to calculate real-world dimensions. | $50 ~ $300 |
| 3 | DSRC Transmitter  | 5.9 GHz frequency band CMOS transmitter for transmission of DSRC messages | $30 ~ $80 |
| 4 | GPS Sensor  | A Global Positioning System (GPS) module for calibrating regional settings | $20 ~ $50 |
| 5 | Device Chassis | A good metal device chassis for better cooling of the components | $15 ~ $45 |

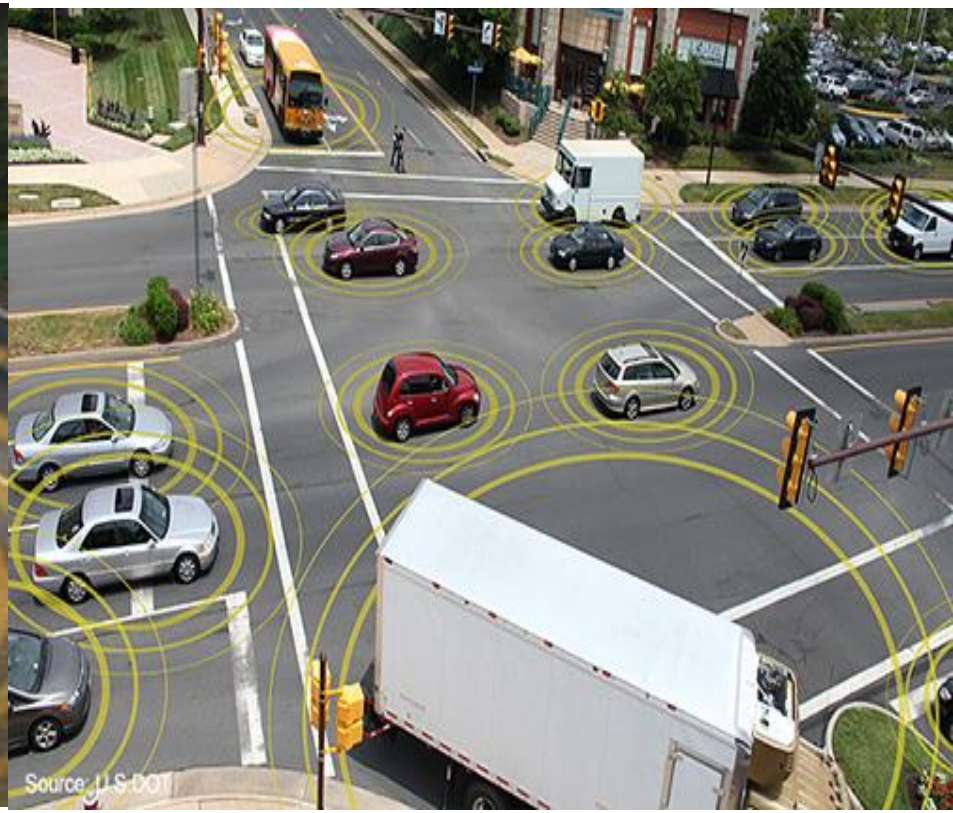
1. No one will ever buy this device in Kazakhstan just for data collection which costs between 615 $ – 1175 $
2. Neural Network is sequential and fully connected which will is quite costy in terms of computational power
3. Information is not secure and can be hacked

# SOLUTION FOR KAZAKHSTAN

1. Koktal DI glasses or headset (Decentralized Intelligent glasses or headset).
2. DI (decentralized intelligent) mobile application for vehicles.
3. DI data platform both for private-sector and emergency agencies (police, ambulance etc.).

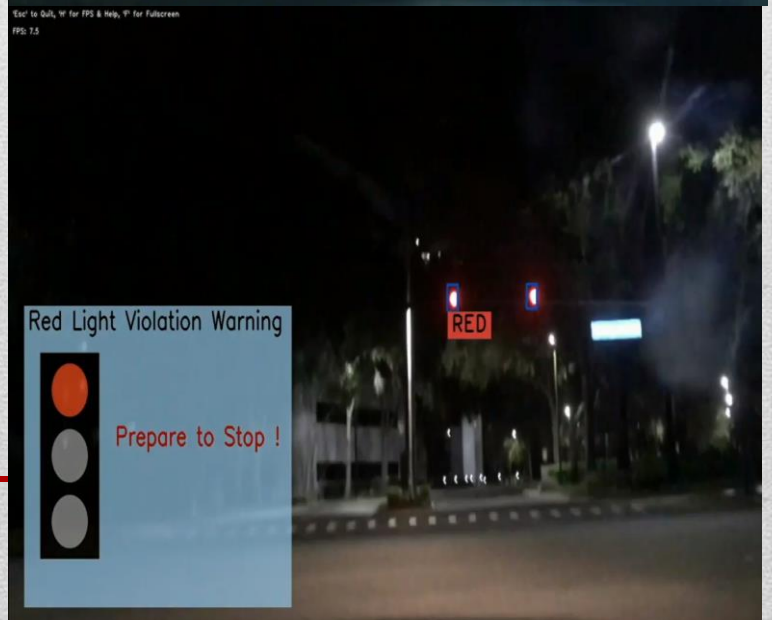
# Interconnection of Vehicles and People via application





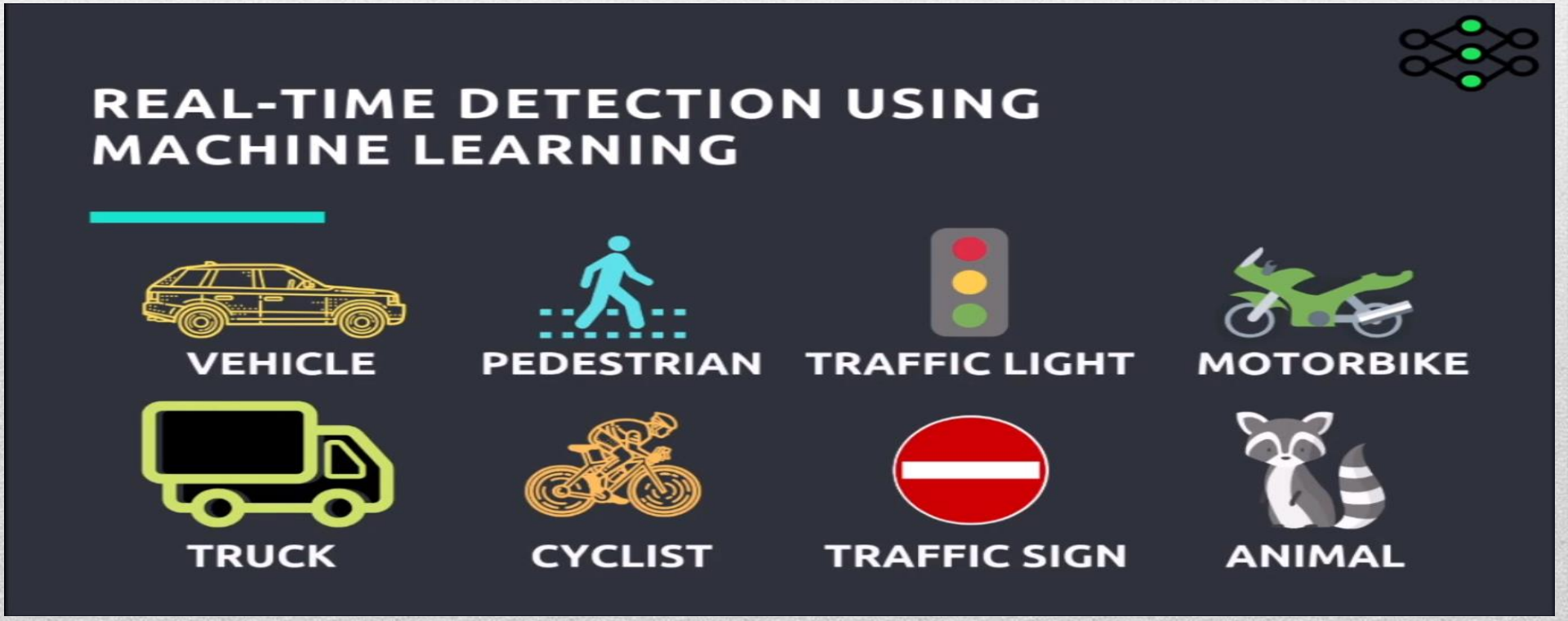
# A BIG DATA PLATFORM FOR GENERAL SAFETY AND COMFORT

- Conveying traffic updates, weather, fire, parking information, crash, robbery or any other incident recognized by Neural Network
- Fuel consumption, emission data
- Roadway design parameters can be updated
- Statistical data of traffic violations for enforcement agencies
- Etc...

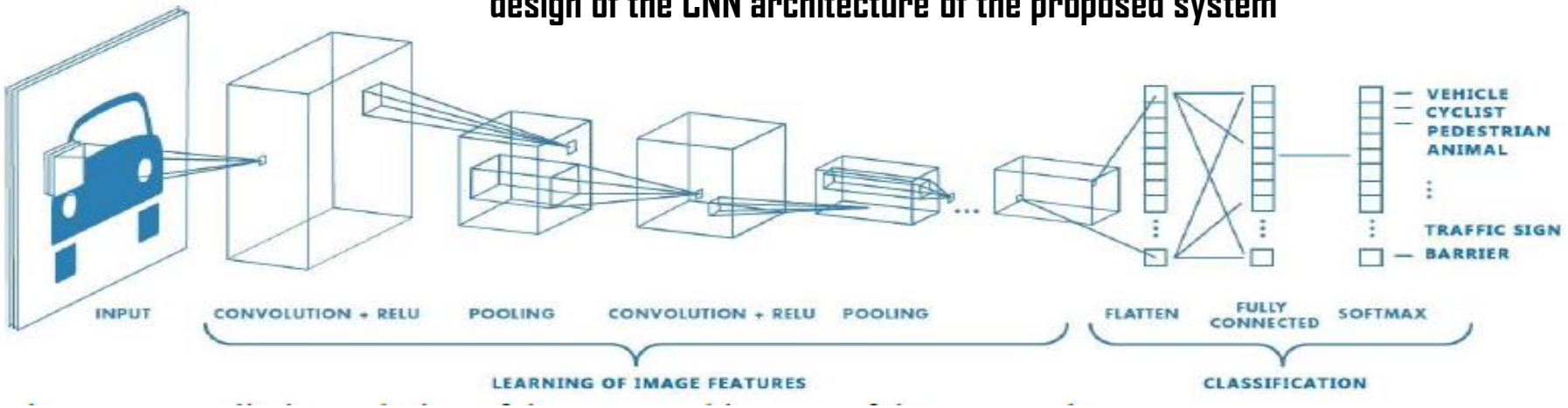
# Integrating an Artificial Intelligence architecture to device

- AI framework requires training of each roadway entity type individually (traffic lights, vehicles, cyclists, pedestrians, animals, obstruction of roadway, damages on the infrastructure etc.) by processing a large number of training images in the artificial neural network (ANN).



# Development of the ANN based framework

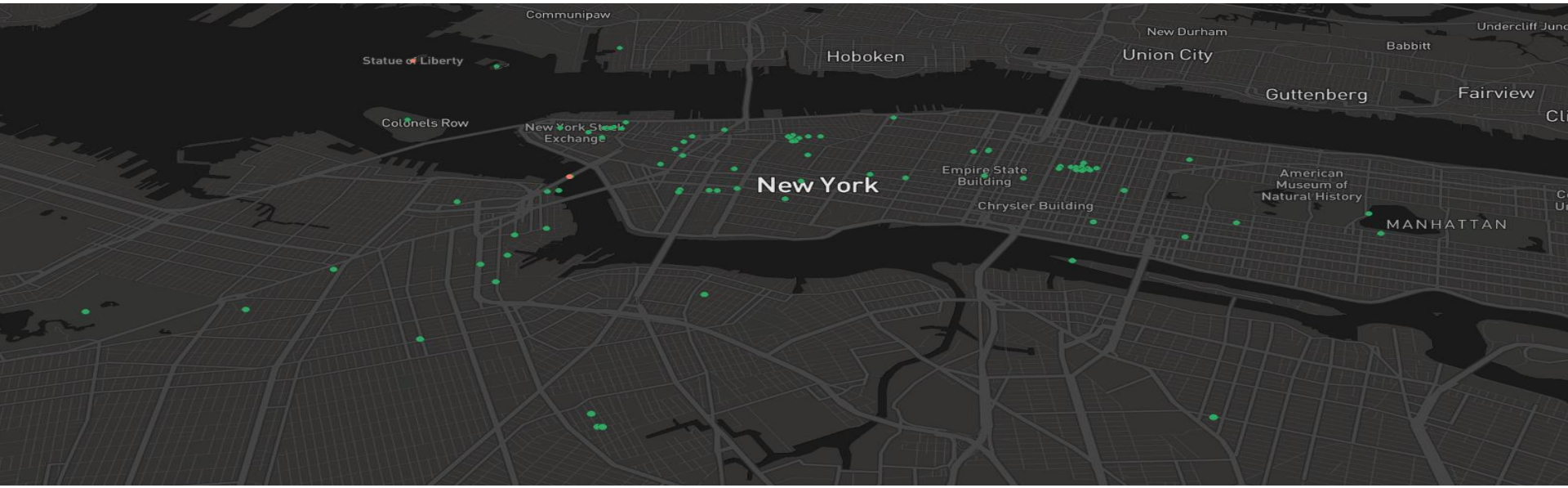
**design of the CNN architecture of the proposed system**




We are going to use PCNN(partly connected neural networks). Since our ANN will be multitask oriented, its architecture will be modified as functional API rather than sequential.

# Blockchain Implementation

1. **Secure data transfer** : Privacy is one of the key concerns in the exchange of information between vehicles and infrastructure.




2. **Cryptocurrency Transaction** : The drivers will be rewarded by KOKTAL cryptocurrency via mobile application for collecting data with a smart on-board device.

# Team

- **Principal Investigator**: Merey M. Sarsengeldin. Phd, associate professor, at Satbayev University and research scholar in Quantum machine Learning at University of Central Florida, founder of Sigma Labs LLP and Sigma LABS Florida, Orlando, US
- **Scientific manager**: Abdullah S.Erdogan, PhD, Director of Sigma Labs Florida, Orlando, US.
- **Key manager** : Mussa Akbota, Satbayev University, Sigma Labs.
- Developers and team for fulfilling the project http://sigmalabs.info/about.html

# FINANCIAL

for 12 months financing :

- Equipment : $ 105.000
- Salary budget: $ 80.000
- Overhead expenses, marketing : $ 20.000

# ABOUT SIGMA LABS

Sigma LABS is a scientific organization focused on science and disruptive technology (data science, blockchain, IOT and their applications). For more info please see **http://sigmalabs.info**

University of Central Florida

Civil and Environmental Engineering Department
Engineering Building 2 Suite 211
(407) 823-2841 • Fax (407) 823-3315
http://www.cee.engr.ucf.edu/

August 2nd, 2018

Sigma Labs LLC, Orlando, FL

Re: Letter of Support

Dear Dr. Merey Sarsengeldin:

We had a great opportunity to discuss on various subjects on machine learning and artificial intelligence and I am pleased to have future collaboration in "Data Science Applications in Transportation Engineering".

I would be glad to form a genuine partnership for the enhancement of the research field and contribution to science as a whole. It is also my pleasure to support an application to the Strategic Partnership for Industrial Resurgence Program.

I expect that our facilities at UCF would suffice your needs and you are welcome to use them. You are also welcomed to attend and participate any of the seminars that are conducted in our lab.

Yours Sincerely,

Haluk Laman, Ph.D.
Department of Civil, Environmental & Construction Engineering
University of Central Florida
Tel: 1-407-414-4764 Fax: 407-823-3315
Email: haluklaman@knights.ucf.edu

# Collaboration with University of Central Florida