



# Autovot

A Vehicle to Vehicle Communication System for  
Autonomous Driving



**B6:** *Joel Anyanti, Fausto Leyva, Jeffrey Tsaw*

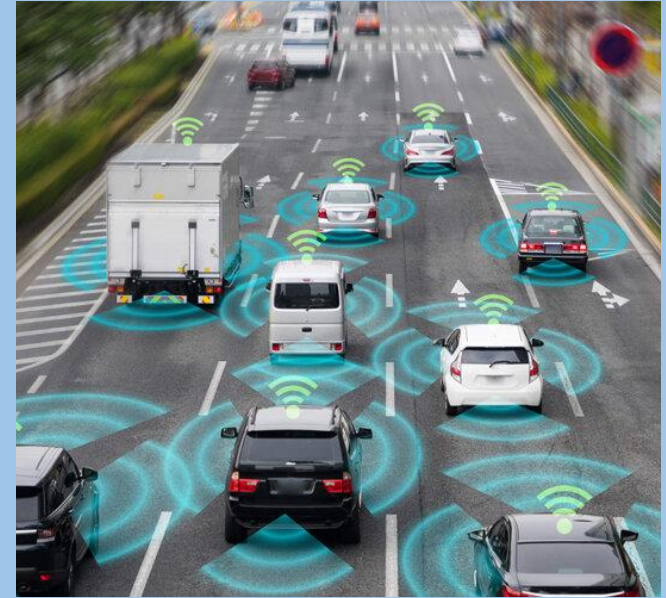
# APPLICATION AREA



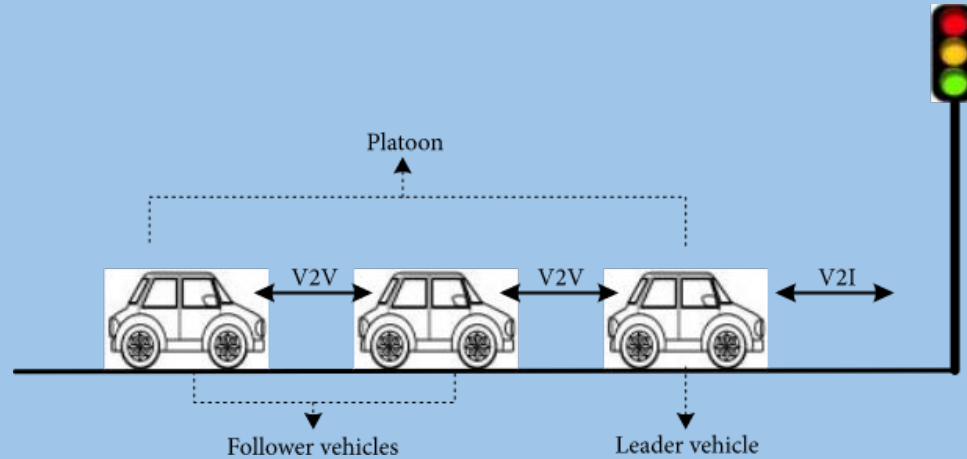
TESLA



cruise

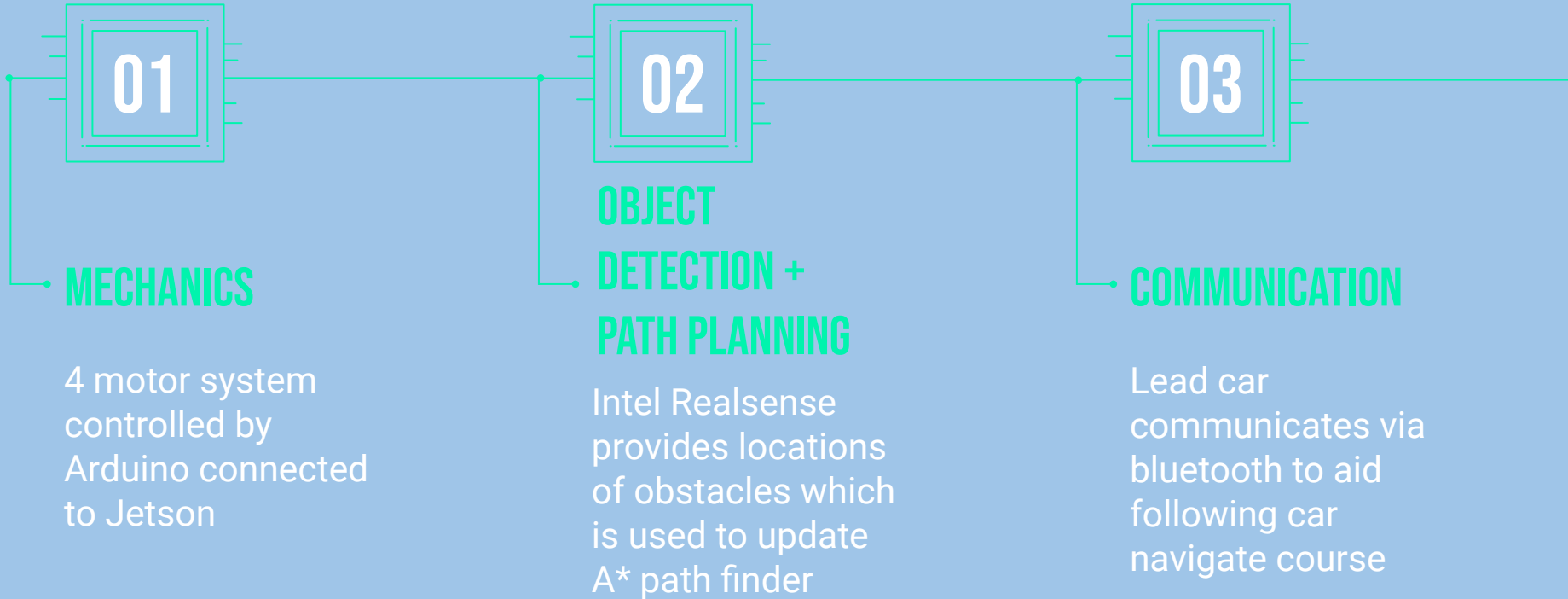


# APPLICATION AREA



- A convoy system with a lead car and trail car with the goal of navigating from one location to another
- RC Vehicles will coordinate task by sending messages to each other to aid in perception and prediction

# COMPLETE SOLUTION



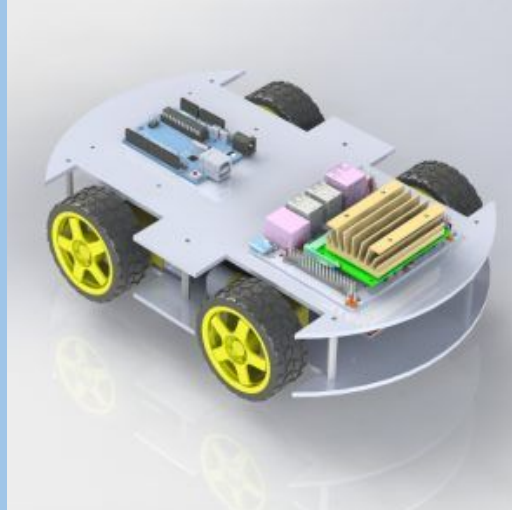
# MECHANICS

## MOTOR CONTROLLER

L298N Shield vs.  
TB6612 Breakout  
Board

## ODOMETRY

IMU + Open Loop  
vs. Wheel  
Encoding



## POWER SUPPLY

Non-Unified Power  
vs. Unified LiPo  
Battery Solution

## WHEEL MECHANICS

Standard Wheels  
vs. Mecanum  
(Omni-directional)  
Wheels

# OBJECT DETECTION & PATH PLANNING

Intel RealSense

RGB Image + MobileNet v1

Aligned depth frame + bounding box → obstacle (x, y) location

Obstacle (x,y)

Find new path through map using A\* → update path for vehicle

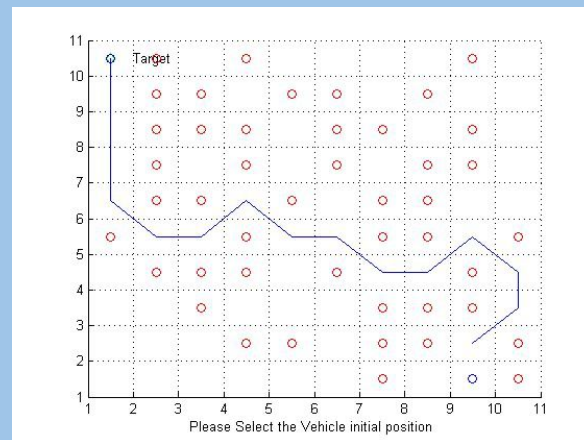
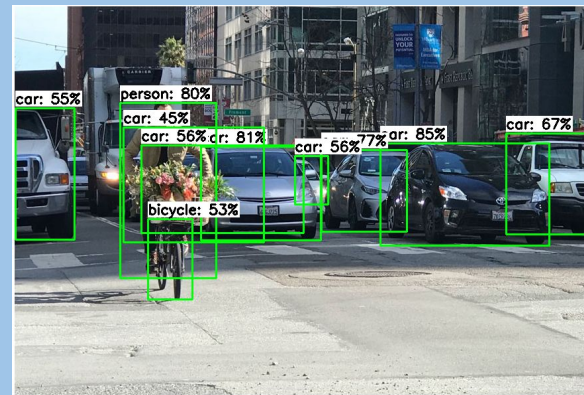
→ RGB + Depth image

→ Obstacle bounding box

→ obstacle (x, y) location

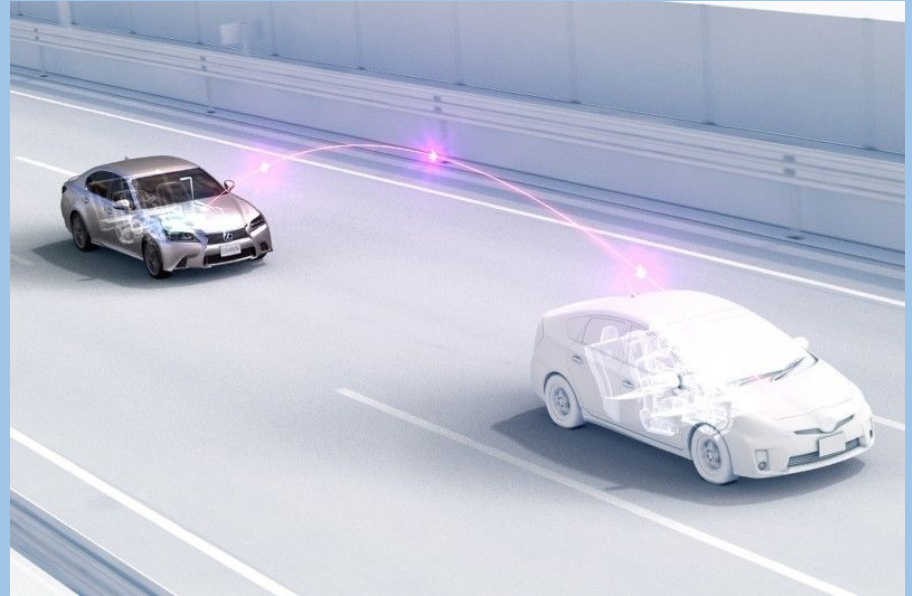
→ update vehicle map

→ update path for vehicle



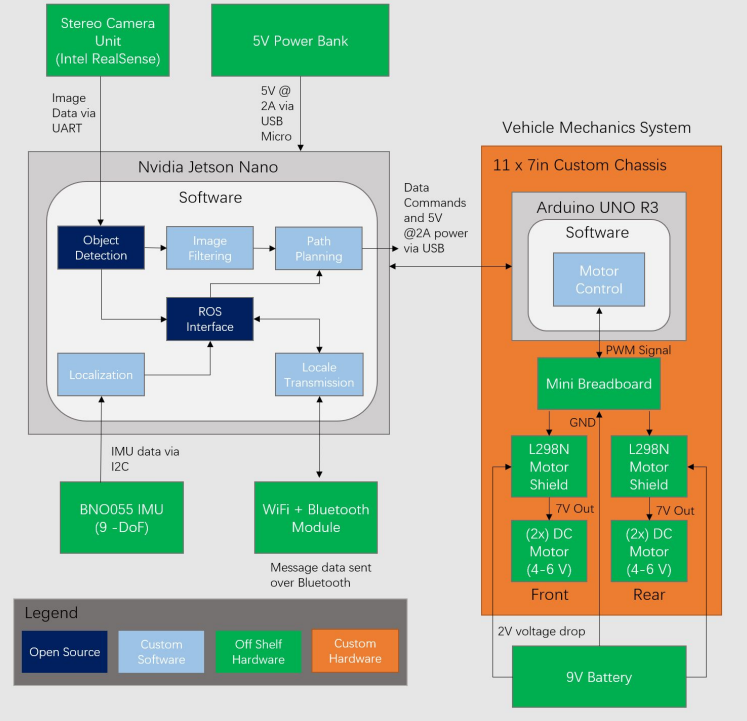
# V2V COMMUNICATION

The obstacles found from object detection are relayed to the trailing vehicle and a path towards our indicated goal is computed using an A\*Star search algorithm.

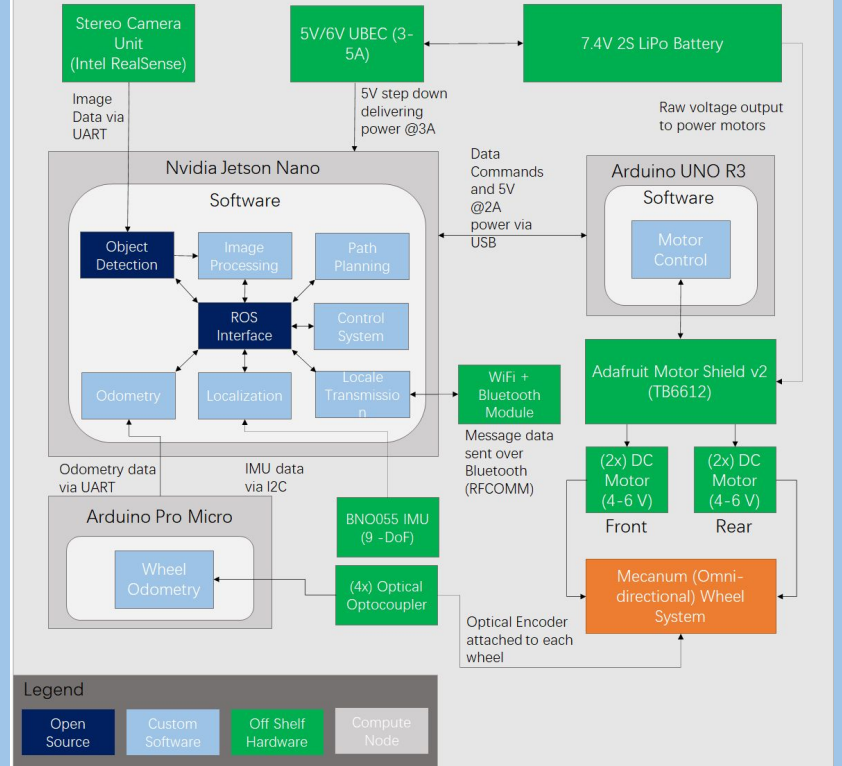


# SYSTEM SPECIFICATION - LEAD CAR

## Autovot: Lead Vehicle System

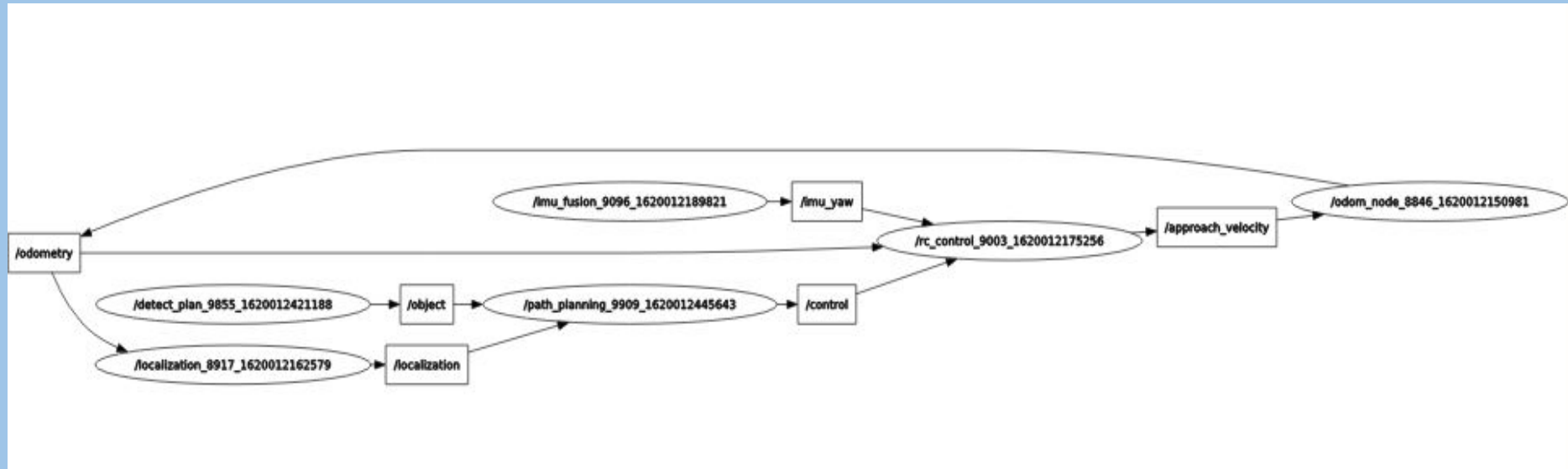


## Autovot: Lead Vehicle System



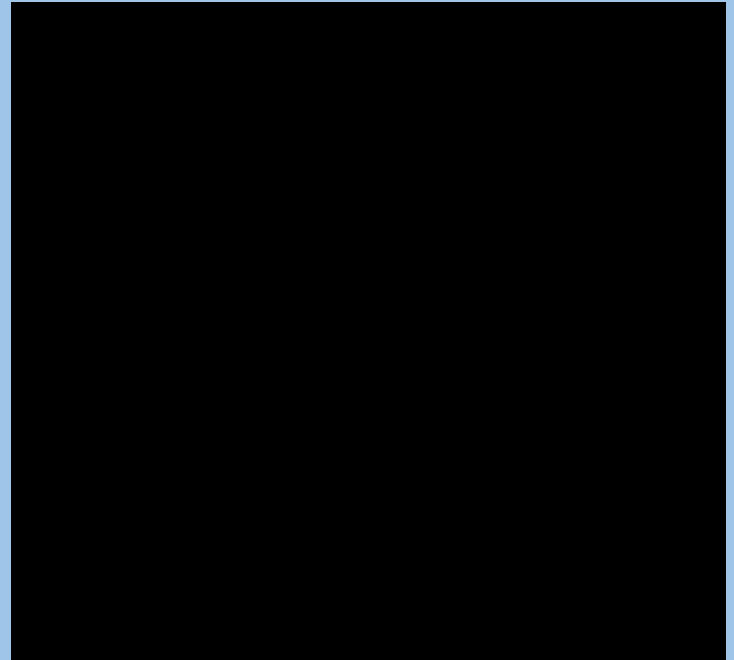


# INTEGRATION



# TESTING, METRICS AND VALIDATION

Metric	Required	Achieved
Vehicle Speed	1m/s	0.5m/s
Object Detection Latency	100ms	~30ms
Path Planning Latency	10ms	~100ms
Communication Latency (64 bytes)	100±40ms	~80ms
Detection recall @ (r= 0.2m, up to 5 objects)	95%	98%
Detection precision @ (r = 0.2m, up to 5 objects)	90%	99%
Course Length	30m	10m
Obstacle type and number	15, 2 classes	5, 1 class



# DESIGN TRADEOFFS

## Vehicle Mechanics

- L298N Motor Shield to Adafruit Motor shield
- Separate 9V, 5V power to 7.4V LiPo Battery + UBEC circuit
- IR optical Optocoupler for Odometry
- Standard Wheels to Mecanum Wheels

## Object Detection & Path Planning

- MobileNet v2 to MobileNet v1
- Angle Heuristic to A\* for planning

