ADAS and Active Safety Feature integration:

Project by:

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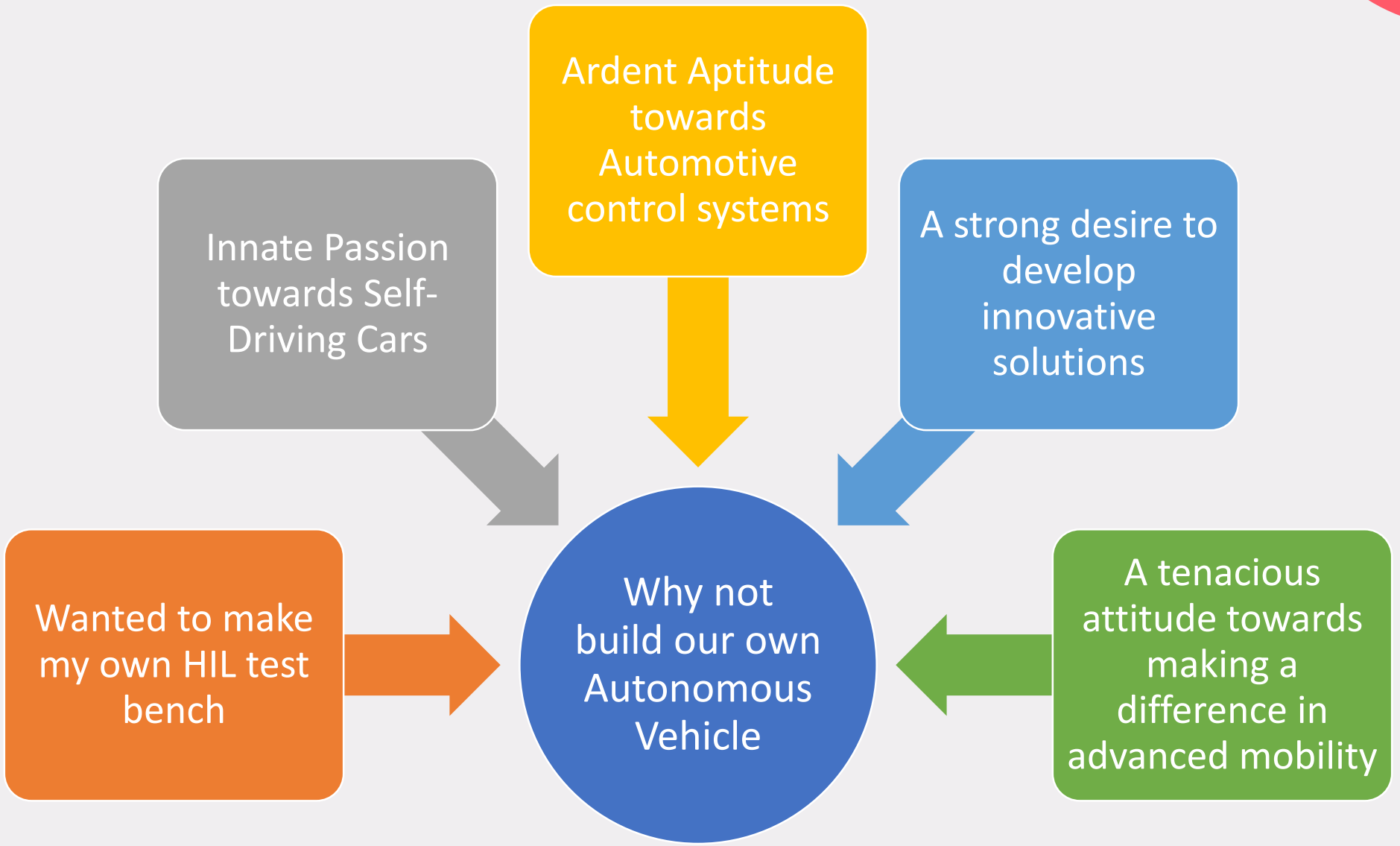
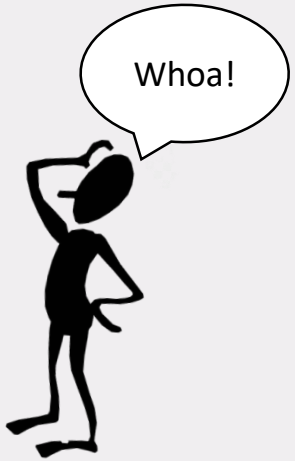
Motivation behind the self-implementation Of this Project

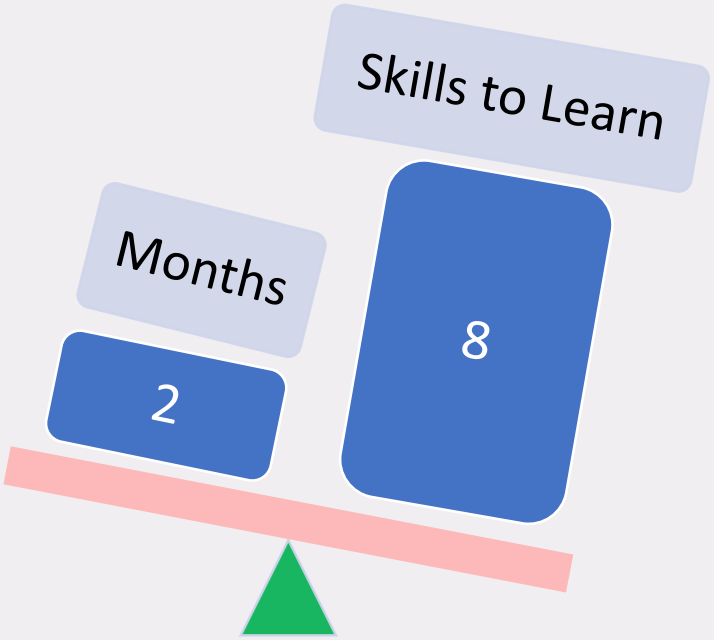


challenges

Skills Needed to materialize the project idea	
Python	• For programming the Algorithms
Object Oriented Programming	• Modular Algorithm Development
Embedded C	• For Programming the Arduino
Image Processing	• For Lane detection
Deep Learning	• Object detection
TCP Socket Server	• Distributed Wireless Computing
Bluetooth Serial Comm.	• Communicate with Arduino Wirelessly
Electronics	• Integration of components

Too much to learn in too little time!





Sailing through the Problems And Solutions

Problems!

FAILED!

Designed First Algorithm

Failed: System Too Slow!
Car wont steer!

Enhanced Algorithm On new car

Solution: Tweaked Algorithm and used a new vehicle model

Failed: System Too Slow!
Car skipped turn

Supervisor Control Technique

Failed: Controller response too slow

Separated Processing and Perception Nodes

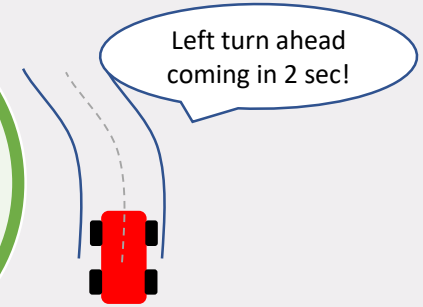
Distributed Control Implemented

Separated Controller node using Arduino on Bluetooth

Failed: Image processing still slow

Stable System Stack Achieved

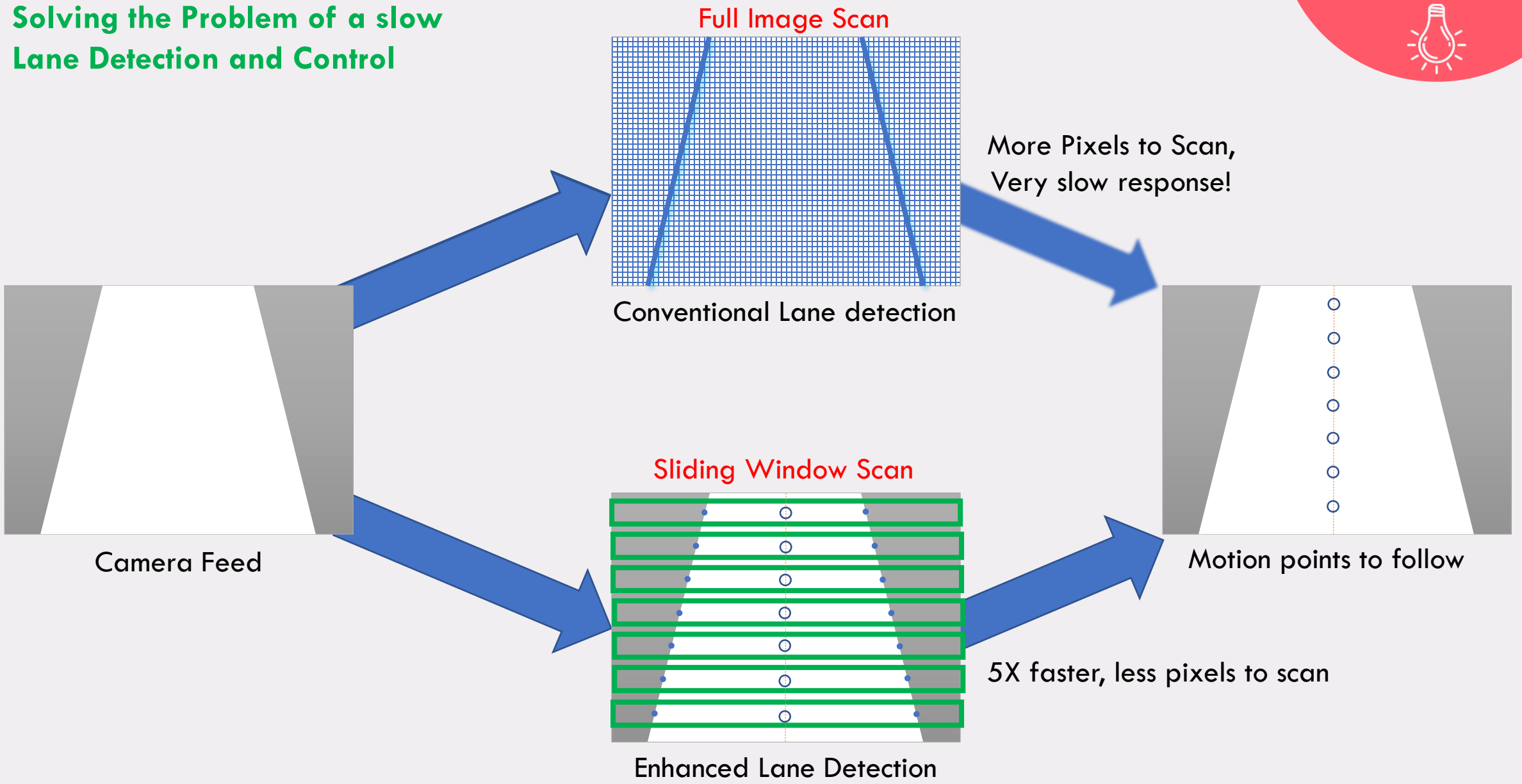
Programmed a new image processing algorithm



SUCCESS!

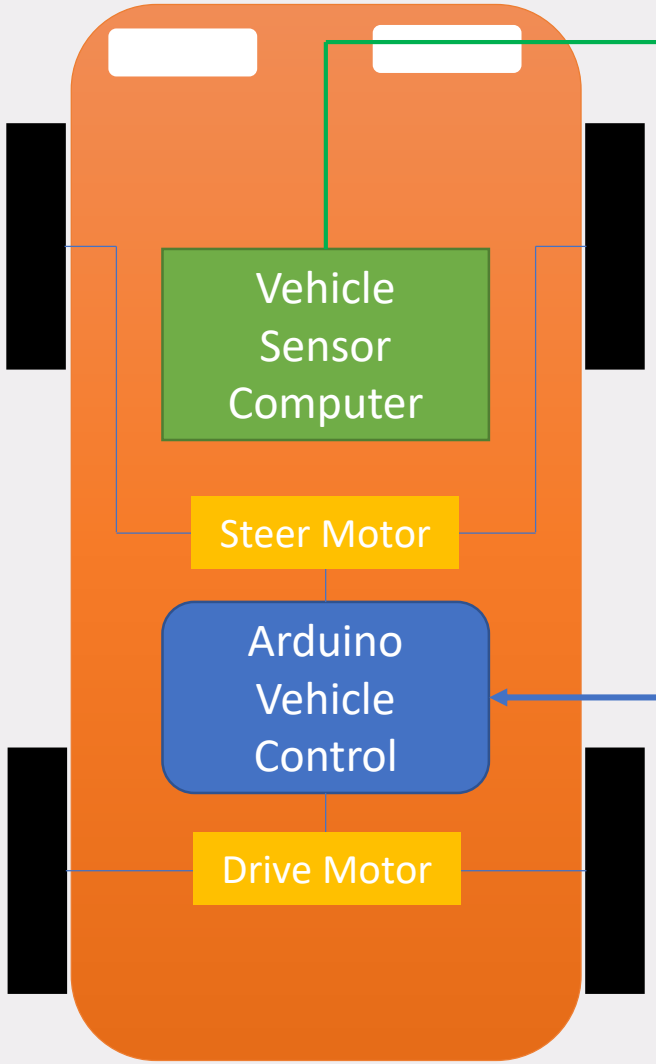
Problem-Solving

Solving the Problem of a slow Lane Detection and Control



The final established control flow after crossing all Failures

Algorithm Flow



Supervisor_control.py

- Distance Sensor data handle
- Camera Video data handle
- Image Preprocessing
  Send to object detection
- Receive perception data
- Generate Control flags
- Send motion flags to vehicle controller
- Multi-threading Handler

Object_detection.py

- Detect Lanes with sliding window Algorithm
- Detect Traffic Signals
- Detect Stop Signs
- Detect Pedestrians
- Detect static and moving vehicles

Vehicle_Motion_Controller.py

- Move Forward
- Move Reverse
- Brake
- Turn Left
- Turn Right

Bluetooth Serial Communication

- Lane Departure Warning
- Lane Keeping Assist
- Autonomous Braking
- Low Speed Following

Achievements

1. No professional help/supervision — Independent
2. Learnt 8 new skills in 2 months! — Rapid Learner
3. Challenging problems due to multiple constraints — Problem Solver
4. Finished while handling full course load — Multi-Tasker
5. Not a part of coursework — Self-Motivated

About Me

Who I am..

- Multi-Tasker
- Result Driven
- Inquisitive Problem-Solver
- Self- Motivated
- Fast-Paced Learner
- Diligent Team Player

- Masters in Mechanical Engineering
- Love Photography & Travelling

Thank You

THANK YOU!

Click this to Catch the project in action: YouTube Video

Project Source Code: GitHub

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"Things work out best for those who make the best of how things work out"

-John Wooden