VIGIWHEELS

Your autonomous sentinel

Table of contents

Why Vigiwheels?

Fire and Smoke Detection

Pressure Monitoring and Anomalies Detection

Intruder Detection

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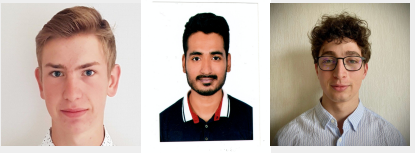
Sprint 4 summary

- Objectives
- What we have done
- Planning management

Objectives

Sprint 4 summary

01	**User Interface**	• Connection Car-Website • Communication User - Vehicle
02	**Fire Detection**	• The car must be able to detect a fire
03	**Instrument reading**	• Reading Manometer value • Communication Docker-Host
04	**Car navigation**	• Implement SLAM for location



Sprint 4 summary

What we have done

The car plays a pre-record path

The car reads the pressure level of a manometer, to check if everything is fine

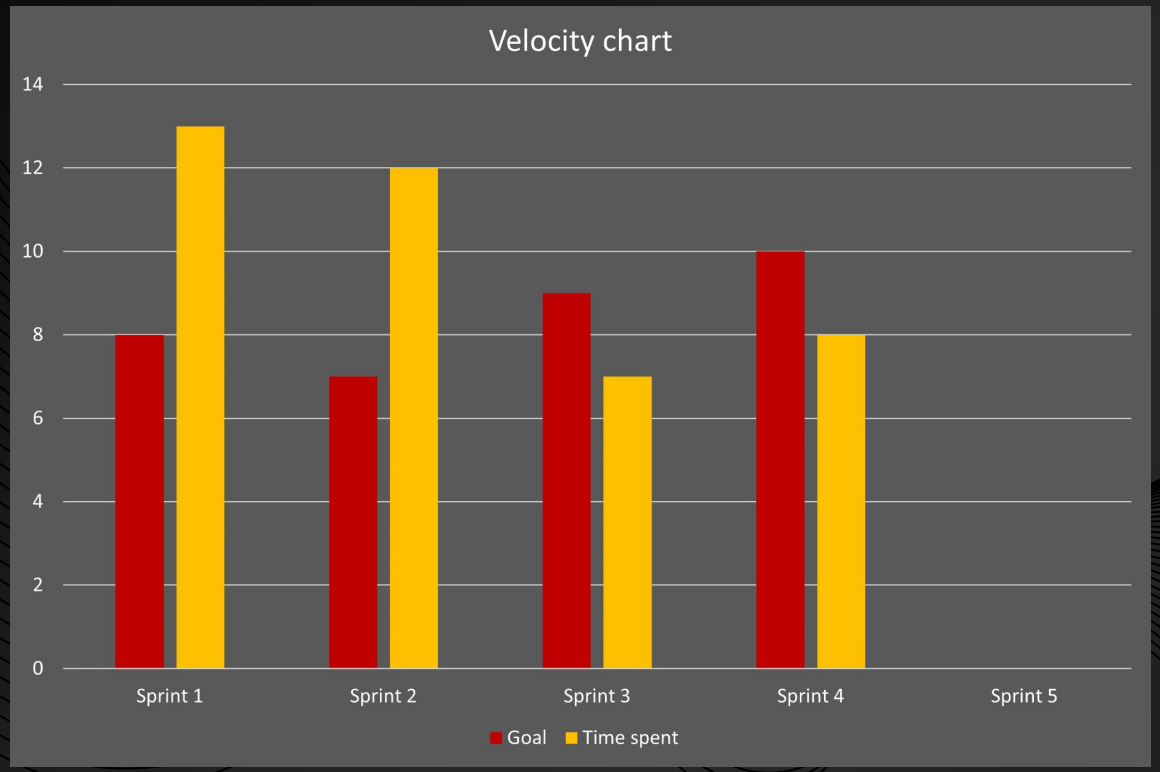
The website summarizes information and states of the car

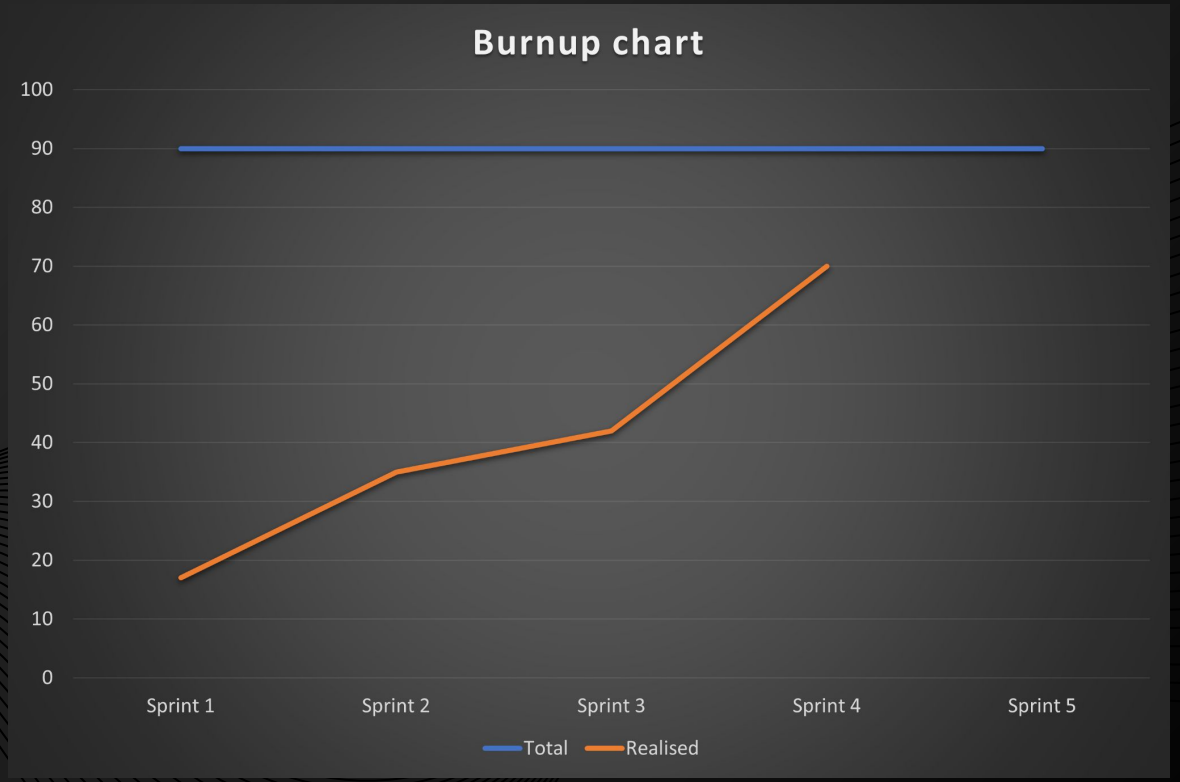
The car can now detect properly fire and smoke

Planning management

Sprint 4 summary

About 80% of what we programmed





Demonstrations

Explanation

Controller

Start and Stop Recording mode

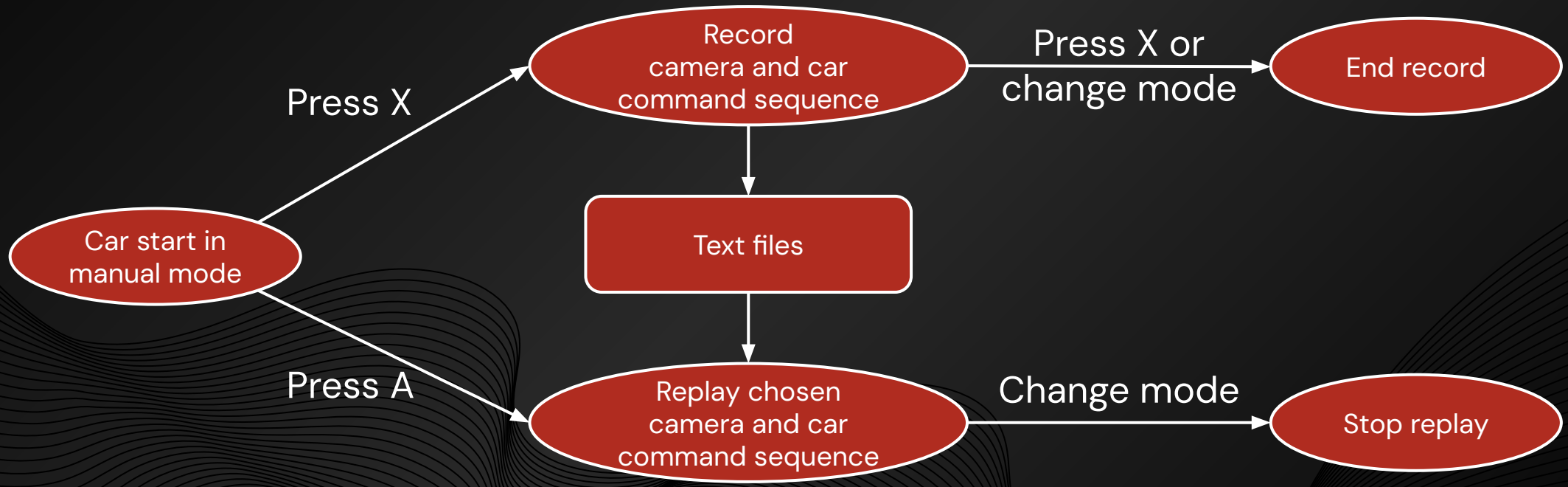
Start replay mode

Set camera in manual mode

Set camera in scan mode

Path recording

Explanation



Demonstration

Path recording

Approval Tests

The register and replay path are the same :

- Precision depends on the record path
- With no sharp acceleration and steering wheels rotation when stop : error < 1 cm
- If a moving obstacle is detected, we lose in precision due to acceleration phase

Reading manometers

Explanation

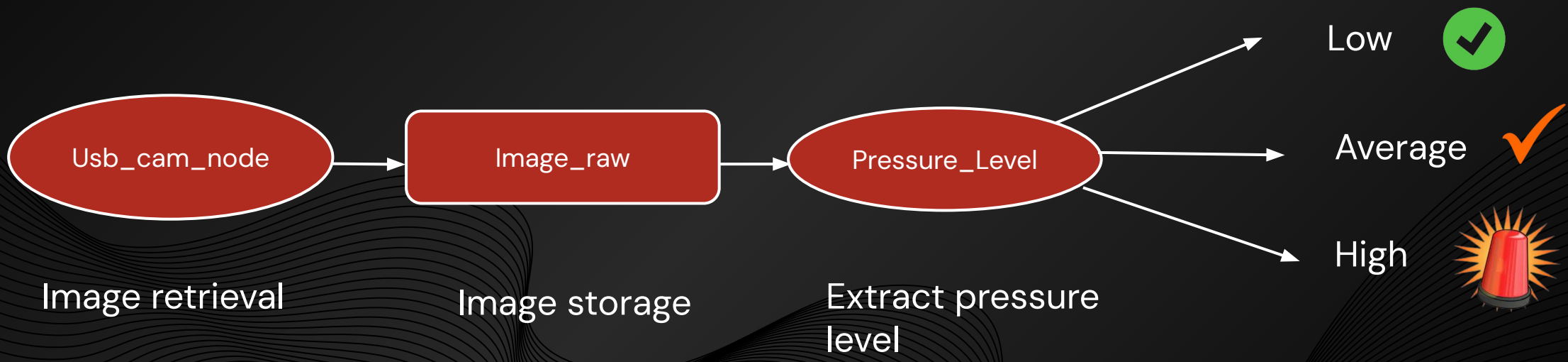
Working in a safe environment

Care of industrial plant and equipment

Be alerted in case of danger as early as possible

Reading manometers

Explanation



Demonstration

Reading manometers

Fire Detection

Demonstration

The car is able to detect smoke ✅

Car Dashboard

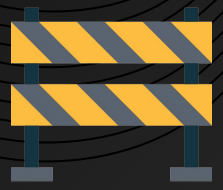
Explanation

- Establish a connection between the website and the car to check the car state in real-time.
- Enable users to access and visualize various parameters of the car.

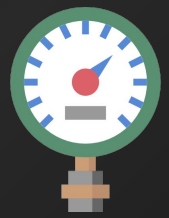
→ A security personnel should be capable of using the car to enhance security.

Battery level

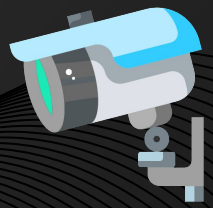
Car speed
Wheel orientation



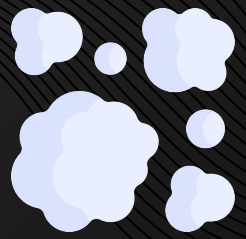
Presence of obstacles



Presence of a manometer



Camera orientation



Presence of smoke

Car Dashboard

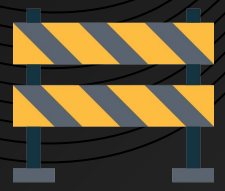
Result & Demonstration

Communication car/website working ✅

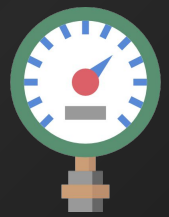
Not all the information is available on the website. ⚠️

Battery level ✅

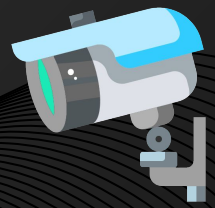
Car speed
Wheel orientation ✅



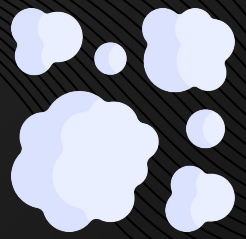
Presence of obstacles ✅



Presence of a manometer ✅



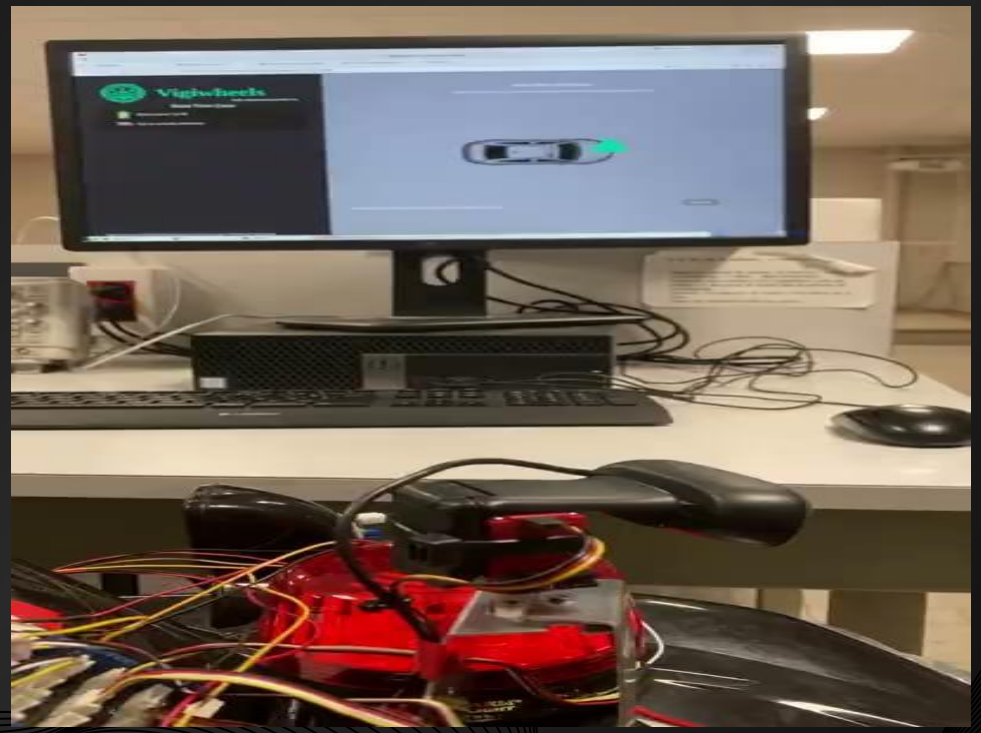
Camera orientation ✅



Presence of smoke ❌

Car Dashboard

Demonstration – Backup



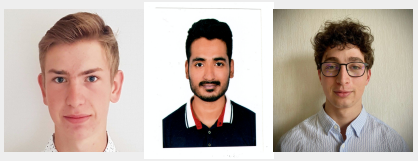
Sprint 5 organization

Next objectives

Team organisation

Organization for sprint 5

Sprint 5

01	User Interface	• Fire and smoke detection • Manometer reading • Choose a file to replay	
02	Fire Detection	• The car must be able to detect a fire and smoke	
03	Intruder Detection	• Intruder detection with QR code	
04	Car navigation	• Implement SLAM for location	

Intruder detection

Sprint 5

Story :
The car detects unauthorized employees within a building. It should trigger an alarm if an unauthorized person is detected.

- State of the art. What has been done before? ~2 days
- Development for employee identification through QR reading ~2 days
- Setting up functionality in communication with ROS ~3 days
- Perform the approval test and resolve bug ~4 days

Approval test :
- If the car is stopped or the alarm is triggered it will request a QR code.
- When an intruder is detected in the building, an alarm is triggered.

Demonstration :
- The car will stop upon detecting an obstacle and read a QR code.

Car Dashboard

Sprint 5

Story

As a user, I want the web page to show more information and choose the path to play

- Fire & Smoke Detection: Show when fire or smoke is detected ~2 days
- Manometer Reading: Show when a manometer is detected and show the value read ~3 days
- Guide Tracking Mode: Choose a saved trajectory file and command the car to replay it ~5 days

Approval Tests

- The car is permanently communicating to the website
- Values are updated within a maximum of 1 second when connected

Demonstration

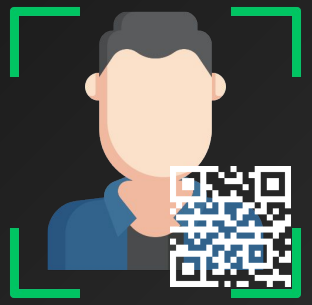
- The web page is connected to the car, the user can navigate between the different data received

Next Demonstrations!

Sprint 5

QR code recognition for intruder

The car recognizes intruders or unauthorized individuals on-site using the value from a QR code.



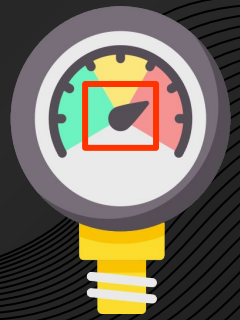
Virtual Dashboard

The website summarizes information and states of the car in **real-time**

The user is able to choose a path to play

Read values from manometer

The can reads the value from manometer, to check if everything is fine



Alarm triggering & notification

Any abnormal activity should trigger the car's alarm and generate an alert on the website.

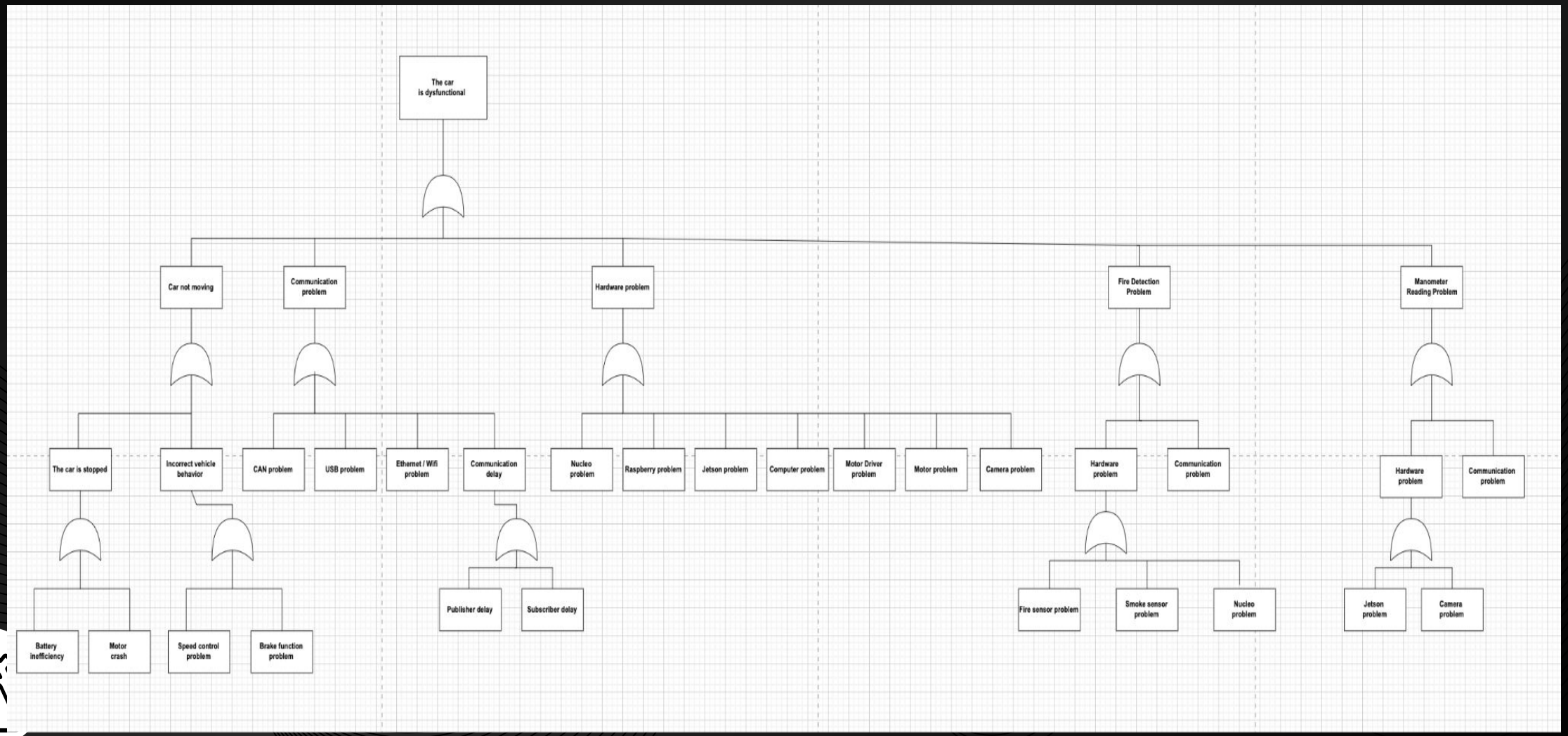
FMCEA and FTA

Component	Function	Failure mode	Cause	Effect	Detection
Camera	See the car environment for nanometer reading	Camera dead	Broken cable, not connected, too old, ...	No detection of the nonometers	While testing camera, while launching the car if no data detection, verifying the cable
		Wrong angle	Broken support, twisted (eg. hit something)	No detection of the environnement or detect not every objects	Verifying the camera angle at the start
		Image quality deterioration	Broken lense, obstruction with something, bad luminosity	Bad efficiency of detection	Seeing the image on the computer
Ultrasonic sensors	Detect obstacles	Wrong detection	Improper mounting	Safety issue (possible accident)	Test sensors regularly and checking the blinking leds
			Water drop, insects, ...		
			Aging component		
			Temperature		
		Sensors dead	No power supply	No reaction from the car	
			Old sensors		
			short circuit		
Wheels motor	Control car's speed and direction	Motor malfunction	Mechanical failure	Wrong car behavior	While using the car
			Bad orientation	Damaged car, steering angle quite important	

FMCEA and FTA

Battery	Provide power to the car	Low battery	Battery depleted	Car speed reduced and can damage other components	Verify battery level regularly
		Battery dead	Old battery Connectivity issue	Car stops	Display 0V, car stops and power off
		Battery leaking	Manufacturing defect	Safety issue	technical inspection
Wheels sensors (IMU and Odom)	Measure number of wheel revolution to calculate speed and distance	Sensor malfunction	Obstruction of the ray	Wrong speed/distance calculation	Bad car behavior
		Sensor dead or disconnected	Short circuit Old component	No feedback on car speed and distance traveled	No car reaction nor data on the computer
Smoke and fire sensors	Detect fire	No detection	No network	Car disconection	Terminal crashing
			Computer battery dead		Computer turned off
		False/positive	AI model precision	Random behavior	Visually
		Big delay for detection	Too much data to process	Bad timing behavior	
Software	Control the car behavior	Crash	No network	Car stop reacting and stay in its last state	Terminal crashing
			Segmentation fault		

FMCEA and FTA



Indoor navigation

Technology

Vigi Wheels

Sensor

Smart

Communication

Autonomous

IoT

Agile

Team

Safety

Mobility

Actuator

Fire

Intruder

Future

Patrol

Your Thoughts, Please?