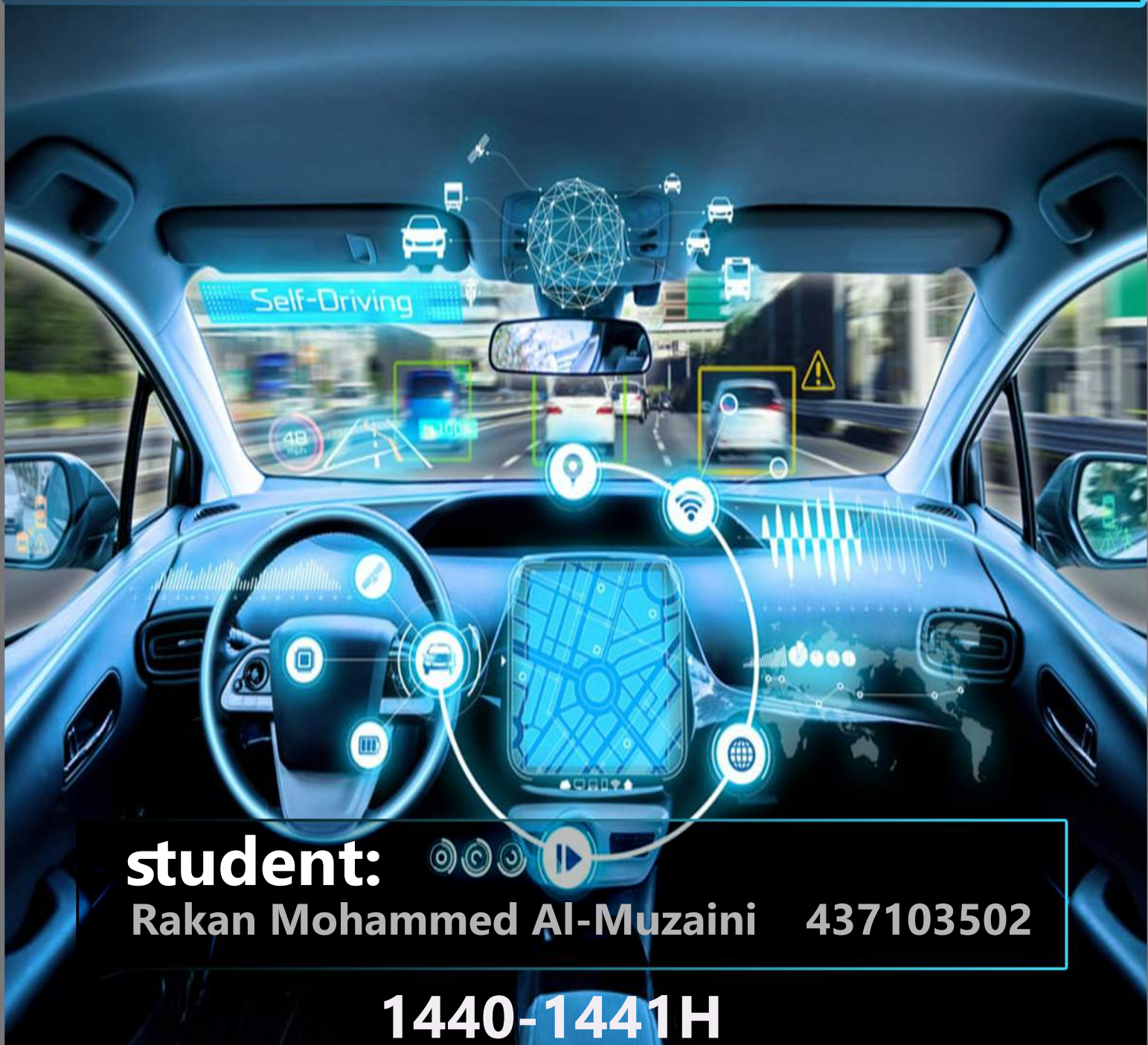


# Introduction to Geographic Information Systems

Dr.Omer Abdualaziz ALRwais

## Self-Driving Cars



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## ***What are self-driving cars?***

Self-driving cars are vehicles equipped with remote sensing devices, enabling them to determine the features of the road and the driverless walk, and these devices include cameras, radars, and the wall that determines the range by light or laser, and these devices are able to see road signs and traffic lights, and measure distances.

## ***How do self-driving cars work?***

Cameras, radar, and wall work together and complement each other, allowing sufficient data to be analyzed to create an integrated surround image of the area around the car, so that you can avoid obstacles, people and other things. Cameras are relatively inexpensive, and they can see traffic lights and road signs and recognize them, but they cannot Measuring distances, while the radar can measure the distance and speed, but it cannot see the exact details.

As for the lidar, it provides precise details, but it is very expensive, confused and confused if it snows in the winter.

Most automotive workers believe that a combination of the three sensors is required to ensure more toxicity, security, and reliability, as data acquisition by vehicle sensors alone is not enough.

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## ***What do cars need to be self-driving?***

these devices then need to be able to distinguish and identify the surrounding objects such as cars, pedestrians in the streets, bicycles, traffic lights, road signs, etc., and (the machine) needs to learn these things and provide them with many examples and models.

For example, the Seattle-based Seattle-based Mighty Artificial Intelligence relies on nearly 300,000 people documenting and tagging street images, drawing boxes around cars and trees and other things for a group of self-driving car customers. and these are some photos that describe the idea obviously.

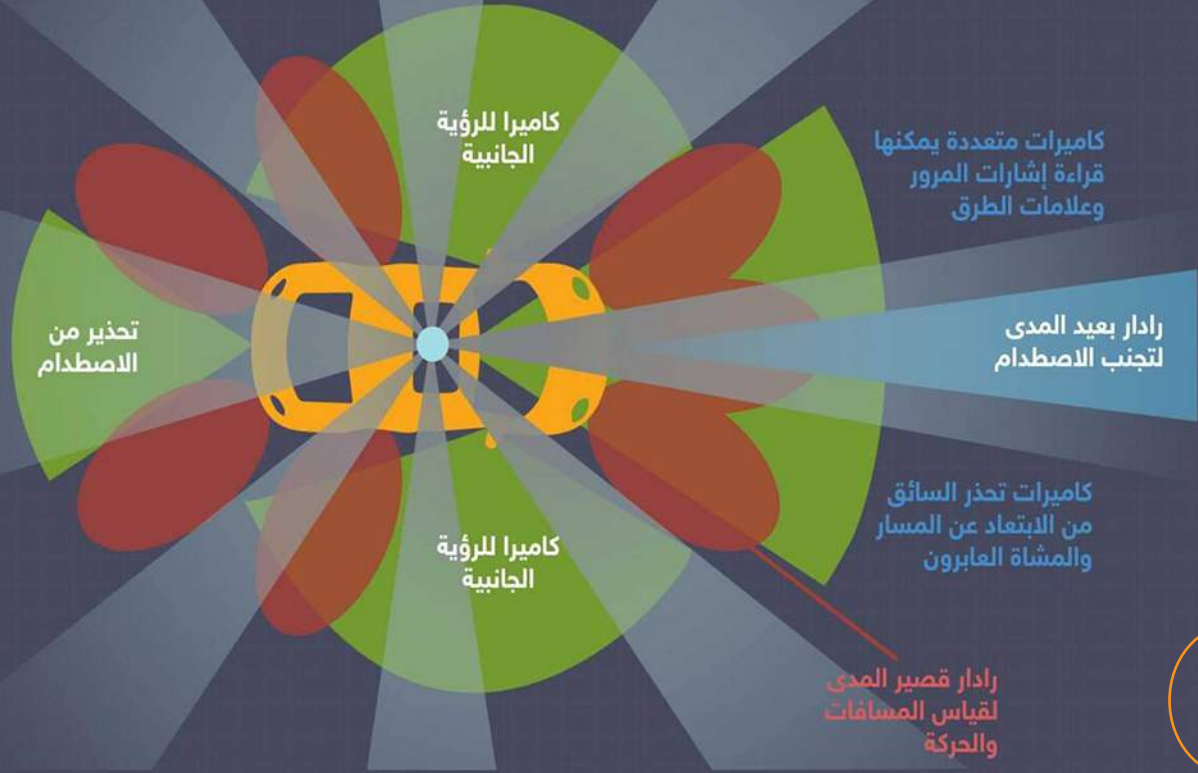
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ليدار: يوفر خريطة محيطية  
(360 درجة) ثلاثية الأبعاد بالغة  
الدقة للمنطقة المجاورة

## رؤية محيطية كاملة

كيف تستكشف السيارة ذاتية القيادة المنطقة المحيطة بها



## كاميرات

تستخدم اختلاف الموضع من الصور المتعددة لاكتشاف البعد عن الأشياء المختلفة. كما يمكن للكاميرات أن تتعرف على إشارات المرور وعلاماته وتساعد على التعرف على الأشياء المتحركة مثل المشاة وراكبو الدراجات الهوائية والنارية.

## وحدة ليدار

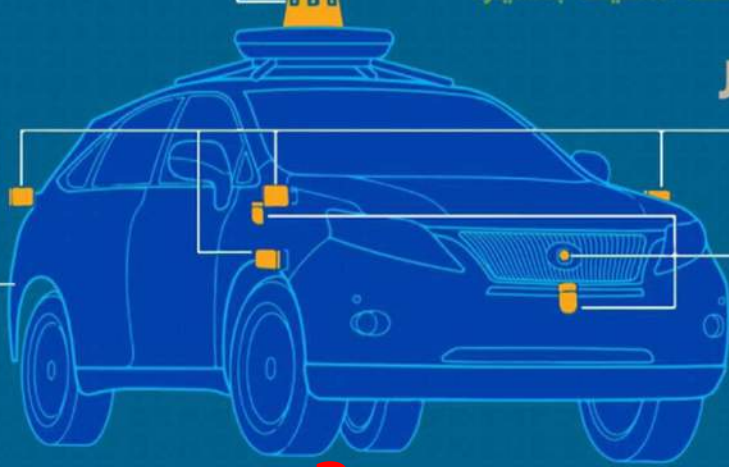
تدور بشكل مستمر وتستخدم أشعة الليزر لتوليد صور بزوايا مقدارها 360° للمنطقة المحيطة بالسيارة

## أجهزة استشعار

تقيس المسافة بين السيارة والعوائق

## الكمبيوتر

يوجد في الصندوق الخلفي للسيارة، ويقوم بتحليل البيانات التي جمعتها أجهزة الاستشعار المختلفة ثم يقارنها بالخرائط المخزنة لديه لتقييم الظروف الآتية.



2

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## كيفية عمل الـ "ليدار"

2. ترتد أشعة الليزر من المرآة التي تدور بشكل دائم مع الغطاء بسرعة دوران تصل إلى مرة كل 10 ثواني

1. يقوم جهاز الليزر ببث أشعة الليزر

3. ترتد أشعة الليزر عن الأشياء إلى المرآة ثم إلى جهاز الاستقبال

4. يتجه الضوء إلى جهاز الاستقبال، حيث يجري تحليل البيانات

5. بواسطة الكمبيوتر في السيارة، يتم توليد صورة للبيئة المحيطة بالسيارة لتجنب العوائق والأشياء



3



4

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This tagged image is later used to train vision systems used in self-driving cars, but the most difficult things that can be identified are gravel and road plastic bags, and muds that cause confusion and obfuscation in the car's receiving system.

But collecting data from different sensors can determine whether or not the object is on track for a solid obstacle.

Cars can also compare the readings of their different sensors with those collected by other cars in a process called "learning the fleet", which could give preference to the first cars that traveled thousands or millions of miles.

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## *What do cars need to be self-driving?*

**1- The feasibility of technology:** In general, there is little debate about the feasibility of automotive technology, because there are already many cars that include some systems that operate automatically without human intervention, such as adapting the car to different speeds, and knowing the surrounding risks.

**2- Digital infrastructure:** It is divided into two main components that cannot be dispensed with:

**A:** Maps technology; autonomous cars need detailed and accurate mapping systems that enable them to translate the surrounding reality, and what makes this system possible is that cars can transmit information about their surroundings to other cars within the framework of a central mapping system. For this to happen, the system needs the second component.

**B:** Constant connection to the Internet, which is the second component of the digital infrastructure, and therefore if some streets are not connected to the Internet it will reduce the efficiency and value of that system in terms of the rate of safety.

**3- Profitability:** If the cost of publishing and promoting that product is high for the producers, then they will refrain from producing them, because the producer ultimately wants to cover the cost of production and achieve a profit margin.



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## ***Reasons to prevent the spread of self-driving cars:***

**1- Snow and weather:** Everyone driving on snow-covered streets may suffer, but the problem is even greater for self-driving cars with the disappearance of accumulated snow lines that define driving lanes.

Self-driving cars rely on cameras to monitor the road, and when there are heavy rains, snow, fog or sandstorms, this bad weather **impedes the ability of cars** to distinguish the road that they are traveling on even in the presence of a radar that distinguishes the presence of objects but cannot determine their shape, so that the computer can recognize them The operator of the car.

**2- Lines and turns:** Everywhere in the world, the lines that define stops and turns, and the limits of tracks on roads differ, and in some cities and towns **the road lines disappear entirely.** This is a problem facing self-driving cars, as it is in this situation that the car must learn the lines in each city separately.

**3- Humans:** In mortgage time and in the near future, self-driving cars have to deal with human drivers and pedestrians **who may not abide by the rules.**

Failure to adhere to rules, such as parking a vehicle in a violation location or passing through non-pedestrian traffic, sometimes confuses self-driving cars.

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## **Some news:**

With the development of the uses of # artificial intelligence, many are watching the popularity of self-driving cars, but the situation remains confusing to planners.



And the matter did not differ during the past few weeks:

The new **CEO of # Uber** announced a billion dollars to invest in developing autonomous vehicles alone, and at the same time Tesla revealed a chip that it had opened in full self-control.



In early April, **Ford's CEO**, Jim Hackett, acknowledged that the news was initially "an exaggeration about the delivery of autonomous vehicles." The company still plans to launch its first self-driving fleet in 2021. In return, Tesla chairman Elon Musk claimed that Self-driving car technology is likely to be safer than human intervention and will be used by **2020**.

And he said,

**"I will be shocked if it is not the next year at most."**

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## Table of reference

1

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2

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<https://2u.pw/SFL8L>