Subsection B.3
The sensor we use in autonomous vehicles are as follows:

1)Thermographic cameras: They use Infrared Radiations to take images of the environment whereas normal cameras use visible light to take images . The advantage of this camera comes when we drive the car at nighttime or in an environment filled with fog and mist where the normal camera cannot take images clearly ,the thermographic camera can take images as they use IR .

2)RADAR:

It is a detection system that uses radio waves to determine distance ,speed and radial velocity.As it uses radio waves which have very high wavelength, they can be used to detect objects at large distances .One disadvantage of using Radar is that the lateral resolution (ability to distinguish two images) are generally low and require large antenna size to get the required resolution.

3)LIDAR:
Light detection and ranging - This sensor targets the environment with laser and calculates the time the laser takes to reflect back to the sensor to make 3d representation of the environment.It is very useful when there is a need to make an accurate 3d mapping.The disadvantage of using Lidar is that it resolution becomes very small at large distances (eg 100m).

4)SONAR:

(Sound navigation and ranging)This system uses sound waves(from low frequency infrasonic to high frequency ultrasonic) to measure distances for navigation.Sonar can be passive or active. Passive sonar systems passively listen for sounds made by nearby objects. Active sonar systems emit sound pulses and read echoes returned from physical surfaces.

The advantage of using Sonar is that its cheap and it can be used to detect large objects at short distances (like metal ,ceramic).
The disadvantage is that Sonar sensors are constrained by the speed of sound(which is very less than speed of light) and sometimes falsely detect non-existing objects.

5)GPS:
Global positioning system:It is a system of many satellites revolving around earth .Self driving cars have gps receivers which when connected to 4 or more gps satelites ,the car location with longitude and latitude can be calculated.It is also combined with digital maps like google maps to calculate the possible and quicker paths.

6)Odometry:It is the use of data from motion sensors to estimate change in position over time.In self driving cars , the positions and orientation of the car can be determined using odometry.It is very useful in lane detection ,lane changing and also in finding best trajectories .

A disadvantage of odometry is that the measurements are indirect, relating the power of the motors or the motion of the wheels to changes in the car’s position. This can be error-prone since the relation between motor speed and wheel rotation can be very nonlinear and vary with time.

7)Inertial measurement unit:It is an electronic device that measures and reports a body's specific force, angular rate, and sometimes the orientation of the body, using a combination of accelerometers, gyroscopes, and sometimes magnetometers.

The disadvantage of using IMU is that uncorrected errors keep accumulating to a significant value(as calculation involves integration of acceleration with respect to time).

Sensor fusion is **the ability to bring together inputs from multiple radars, lidars and cameras to form a single model or image of the environment around a vehicle.**

Sensor fusion increase accuracy to a great extent and also gathers more data.