Autonomous Vehicle Parking System

The autonomous vehicle parking system includes different components: Driver (D), Autonomous Vehicle (AV), Parking Service Provider (PSP), and Parking Lot Terminal (PLT). For instance, the D can use the mobile device (e.g., phone or tablet) to contact the PSP and send the AV commands. The PSP, for example, could own and manage several PLTs, where AVs can be parked.

Autonomous Vehicle (AV)

The autonomous vehicle is capable of sensing its environment and operating without driver involvement. The driver or other passengers are not required to take control of the vehicle at any time while performing everything that an experienced human driver does.

Parking Service Provider (PSP)

A parking service provider is a group of online servers that provide the on-demand parking service for the users offered by a parking management company. These services are also subscription services. The parking service provider allows the driver to achieve the following:

- Check and find nearby parking spaces
- Mark parking space reservation and other premium services
- Check the parking lot availability
- Registers/remove driver to/from the service.

Parking Lot Terminal (PLT)

The parking lot terminal is a terminal deployed by the owner of the parking lot, which is responsible for monitoring and managing the parking lot through IoT devices (e.g. cameras and sensors). The PLT manages access of the AVs to a parking lot, and controls and releases parking permits to the driver through the PSP.

Driver (D)

An autonomous vehicle driver is a person using the autonomous vehicle and in need of the parking service and with the capability to initiate the parking service.
Parking Service

The parking service consists of several processes:

- **Registration with the service provider.** Here, the D contacts the PSP and registers the AV for the parking service.

- **Checking parking availability and issuing parking permit.** Once the parking request is received from the D, the PSP checks the PTLs for the available space and, if found, issues the parking permit. The parking permit is sent to the D.

- **Park vehicle.** The D leaves the AV at the drop/pick-up area in PLT and submits the AV’s parking permit. The AV navigates and parks to the assigned space in the PLT.

- **Get vehicle back.** When the D wishes to get the car back, she/he sends the command to the AV, which navigates to the drop/pick-up area.

- **Pay for parking service.** Once parking is completed, the PLT informs PSP. The PSP issues the invoice and contacts the D, who proceeds with the payment. Once payment is made, the PSP is notified.