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## Thème

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IoT SMART PARKING: EVALUATION OF DIFFERENT APPROACHES  
FOR EFFICIENT PARKING MANAGEMENT

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### Réalisé par:

ZIANE Mohammed  
SEGOUAT Mohcene Abdelouahed  
BELFAR Ilyas

### Encadré par:

Pr. RAHMOUN Abdellatif  
Dr. BENSENANE Hamdane

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## ABSTRACT

Urban areas around the world experience constant exponential population growth and an increasing number of vehicles on the streets, and as a result, traditional parking operators with their classic infrastructure that requires a lot of human intervention are struggling to meet this enormous demand.

Faced with this problem, one can only think of an intelligent parking system as a solution, and thanks to IoT technology, this solution is easy to implement and easier to use. IoT Intelligent parking systems use a variety of devices and technologies such as sensors, connectivity, and data analysis.

These systems enable real-time monitoring of parking spaces and provide accurate information about availability and occupancy. Drivers can access current parking data via mobile apps or electronic signage, enabling them to quickly find free parking spaces and reduce unnecessary search times. This not only increases driver comfort but also reduces traffic congestion, lowers carbon emissions, and optimizes fuel consumption.

**Key words:** Parking System, Connected Objects, IoT, Smart City, Automation, Assessment, System Architecture, Urban Mobility, Parking Management, Evaluation.

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- ZIANE Mohamed.

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DEDICATED

*I sincerely dedicate this work to my late grandfather **MEZROUAI Mohamed Saleh**, my late grandmother **MEZROUAI Kheira (Dhawia)** and my late aunt **MEZROUAI Rafika**, I pray to Almighty God to have mercy on all of them, forgive them, and grant them the highest ranks in his Paradise.*

- ZIANE Mohamed.

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**IoT** Internet of Things.

**IIoT** Industrial Internet of Things.

**IPS/SPS** Intelligent/Smart Parking System

**SPT** Smart Parking Technology.

**RFID** Radio-Frequency Identification.

**LPDR** Licence Plate Detection and Recognition.

**ANPR/ALPR** Automatic Number/License Plate Recognition.

**OCR** Optical Character Recognition.

**LCD** Liquid Crystal Display.

**YOLO** You Only Look Once.

**CNN** Convolutional Neural Network.

**OpenCV** Open Computer Vision.

**DES** Discrete Event Simulation.

**MQTT** Message Queuing Telemetry Transport.

**HTTP** Hypertext Transfer Protocol.

**CoAP** Constrained Application Protocol.

**LoRaWAN** Long Range Wide Area Network.

**UDP** User Datagram Protocol.