



**POLITECNICO**  
MILANO 1863

# Prior art search: what is it and how to perform it?

*"IP" h.D. - Intellectual Property fundamentals for Ph.D. Students  
June 12, 2023*

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*Politecnico di Milano  
Technology Transfer Office*

- Introduction
- Patent databases
- Prior art searches
- Classification symbols
- Example



# Why prior art searches are important!

To avoid «reinventing the wheel» (waste of R&D resources)

To avoid infringement of other companies' patents

To write a better patent application

To speed up the prosecution of a patent

To find out the most recent inventions

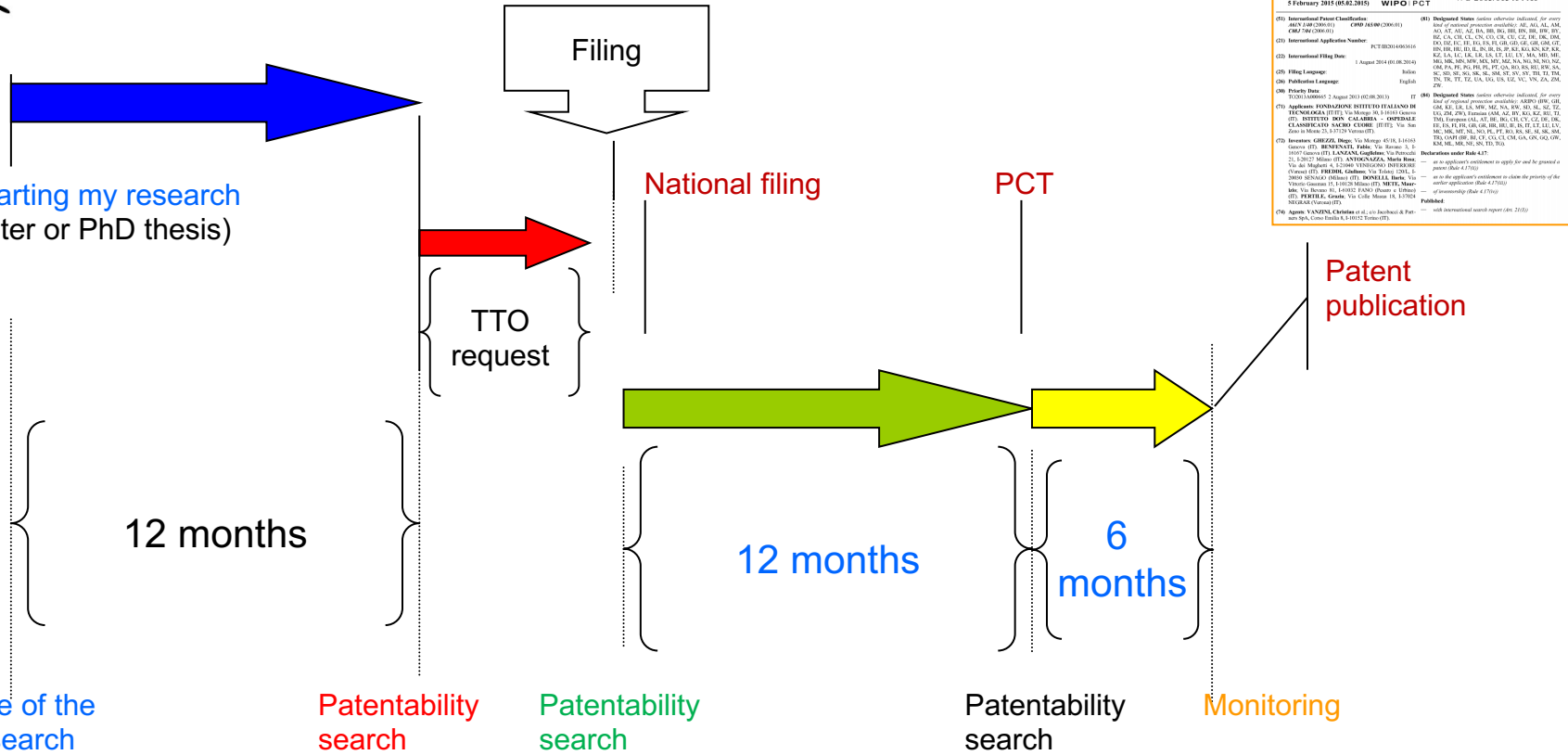
To study the development of a particular technology



# When do we perform prior art searches?



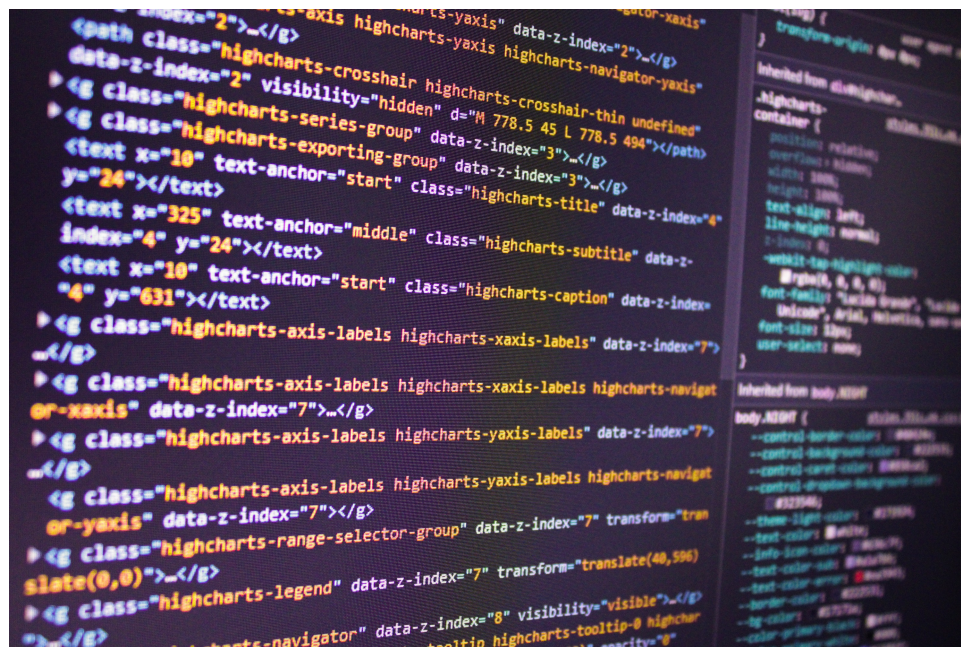
Before starting my research  
(e.g. Master or PhD thesis)



## The entire patent procedure



- Introduction
- Patent databases
- Prior art searches
- Classification symbols
- Examples



## Free of charge sources

- ✓ (provided by national or regional patent offices)

Espacenet, Patentscope

- ✓ (provided by independent producers)

GOOGLE PATENTS, Free Patents Online

## Fee-based sources

- ✓ Derwent Innovation, Orbit Intelligence, Patbase



- Coverage [Countries (EP, US, CN) and number of docs]
- Search engine
  - different results obtained

Search for «graphene» in the abstract field

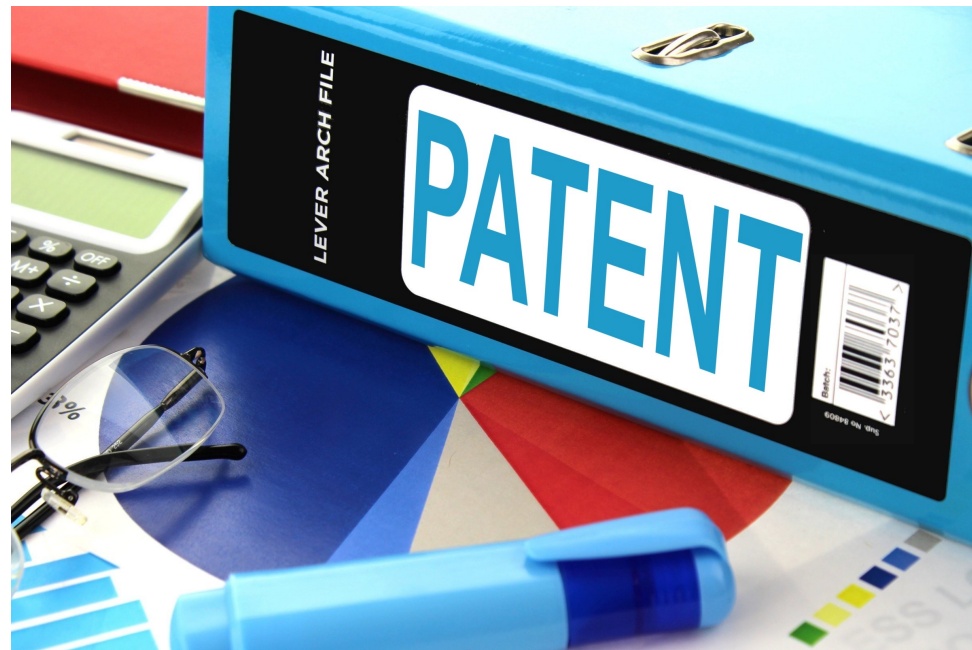
Database	Results
Espacenet	83,446
Patentscope	86,185



Use more than one patent database



- Introduction
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- Prior art searches
- Classification symbols
- Examples





Scope of patent searches: to find out documents that claim similar technical features and not a mere match of words.

A patent search may be carried out:

- by keywords (intuitive but subjective)
- by classification codes
- by citations

Language-independent search tools

Operators:

✚ Boolean (AND, OR, NOT)

✚ proximity

Language used: English



### The important things to remember are:

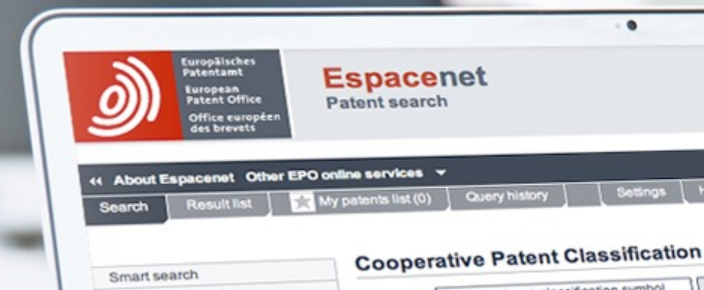
1. Analysis of the information received about the invention (identify the essential features)
2. Identification of the most suitable databases for finding the prior art
3. Planning of a search strategy (how to select and combine KWs and classes)
4. Evaluation of the retrieved documents

### Some useful tips:

- Search in the title + abstract + claims (rather than in the full text), using precise KWs and classes [*start small, expand carefully*]
- Avoid long search queries, don't combine all aspects in one query
- Aim for small result sets (50 records) and then expand the search
- If you find a very relevant document, do forward and backward citation searches immediately (make use of the expertise of patent examiners!)



- Introduction
- Patent databases
- Prior art searches
- **Classification symbols**
- Examples



Classification is a system of sorting inventions and their patent documents into technical fields covering all areas of technology. Every patent document is given a classification symbol by the examiner.

Patent offices developed classification systems in the 19<sup>th</sup> century in order to cope with the growing volume of patents and non-patent literature.

The most used patent classifications today are the IPC and the CPC.

The IPC is a hierarchical classification systems. The top level consists of 8 sections (A - H) which are divided into 80,000 subdivisions called classes, subclasses, groups and subgroups.

The CPC is an enhanced version of the IPC, uses the same structure as the IPC but with more subdivisions.



Graphene: C01B 32/182  
 Section: C (Chemistry)  
 Class: C01 (Inorganic chemistry)  
 Subclass: C01B (Non-metallic element)  
 Group: C01B 32/00 (Carbon compounds)  
 Subgroup: C01B 32/182

Full view

Hierarchic view

Maingroup view

Tree view

CPC  FI

Deleted entries

Subclass indexes

Guidance Headings

Notes

CHEMISTRY

-	<b>C01</b>	<b>INORGANIC CHEMISTRY</b>	<p>Note(s) [2006.01]</p> <ol style="list-style-type: none"> <li>In subclasses C01B-C01G, the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, a compound is classified in the last appropriate place, e.g. potassium permanganate is classified only as a permanganate compound, in subclass C01G.</li> <li>Biocidal, pest repellent, pest attractant or plant growth regulatory activity of compounds or preparations is further classified in subclass A01P.</li> </ol>
D	-	<b>C01B</b>	<p><b>NON-METALLIC ELEMENTS; COMPOUNDS THEREOF</b> (fermentation or enzyme-using processes for the preparation of elements or inorganic compounds except carbon dioxide C12P 3/00; production of non-metallic elements or inorganic compounds by electrolysis or electrophoresis C25B)</p> <p>Note(s) [2006.01]</p> <ol style="list-style-type: none"> <li>In this subclass, tradenames that are often found in scientific and patent literature have been used in order to define precisely the scope of the groups.</li> <li>Attention is drawn to the definitions of groups of chemical elements following the title of section C.</li> <li>Attention is drawn to Note (1) after class C01, which defines the last place priority rule applied in this class, i.e. in the range of subclasses C01B-C01G and within these subclasses.</li> <li>Therapeutic activity of compounds is further classified in subclass A61P.</li> </ol>
D	▲	-	<p><b>C01B 32/00</b> <b>Carbon; Compounds thereof</b> (C01B 21/00, C01B 23/00 take precedence; percarbonates C01B 15/10; carbon black C09C 1/48) [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/15 • Nanosized carbon materials [2017.01]</p> <p style="margin-left: 20px;">- <b>C01B 32/182</b> •• <b>Graphene</b> [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/184 ••• Preparation [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/186 ••• by chemical vapour deposition (CVD) [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/188 ••• by epitaxial growth [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/19 ••• by exfoliation [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/192 •••• starting from graphitic oxides [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/194 ••• After-treatment [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/196 ••• Purification [2017.01]</p> <p style="margin-left: 20px;">- C01B 32/198 ••• <b>Graphene</b> oxide [2017.01]</p>

IPC PUB v8.4  
 Last modified: 2020.03.24



- Introduction
- Patent databases
- Prior art searches
- Classification symbols
- Example



- ✓ A device used for inhibiting the automatic opening of cars' door
  - ✓ a sensor warns drivers not to open a door if someone or something is approaching from the rear or on one side



Home > Results > US2009256707A1

Query language: en de fr

AND + Field

Title, abstract or claims all → Group

car door

OR + Field

Title, abstract or claims all → Group

bike?

Title, abstract or claims all → Group

bicycle?

Title, abstract or claims all → Group

sensor?

Search Reset

- ### 278 results found
- List view Text only List content All Sort by Relevance
- (0 patents selected) Select the first 60 results
- bicycle lock structure, a rotatable parking plate is arranged in a bicycle shed, and the front bicycle lock structure and the rear bicycle lock structure... an unlocking holding rod. The rear...
43. Take automatic control structure of opening tail -gate of control by te...  
CN206299275U • 2017-07-04 • BEIJING SHUNHENGDA AUTOMOTIVE EL...  
Earliest priority: 2016-11-14 • Earliest publication: 2017-07-04  
... , include automobile body control module and release sensor, temperature sensor, distance sensor rather than the speedtransmitter, pressure sensor, the infrared electricity that are connected respectively, distance sensor installs at the tail -gate, pressure sensor and
44. Battery car and seat cushion cooling device thereof  
CN211969632U • 2020-11-20 • UNIV NORTH CHINA ELECTRIC POWER  
Earliest priority: 2020-03-10 • Earliest publication: 2020-11-20  
...The utility model discloses a battery car and a seat cushion cooling device thereof. The device comprises a singlechip, a temperature sensor, a control circuit, an electric sprayer, a water tank and apower supply, wherein the temperature sensor is connected... electric
45. Novel folding shared bicycle garage  
CN211597900U • 2020-09-29 • LIAONING INST OF SCIENCE AND ENGIN...  
Earliest priority: 2020-01-06 • Earliest publication: 2020-09-29  
...The invention discloses a novel folding shared bicycle garage and mainly relates to the field of shared bicycle garages. The garage is composed of a garage outer shed and a garage body. Garage rollershutter door arranged on side face of... bicycles can be stored
46. Multichannel three -dimensional bicycle garage is with putting storeh...  
CN206521973U • 2017-09-26 • ZHEJIANG HYTFIA TECH CO LTD  
Earliest priority: 2017-02-17 • Earliest publication: 2017-09-26  
...The utility model relates to a stereo garage technical field discloses a multichannel three -dimensional bicycle garage is with putting... bottom in warehouse entry storehouse is

☆ US2009256707A1 DEVICE AND METHOD TO PREVENT DAMAGE TO OBJECTS MOUNTED ON TOP OF AUTOMOBILES Patent Translate

Bibliographic data

Global Dossier

Inventors USCHOLD ROBERT C [US]; USCHOLD JAMES E [US]; STOWE ROBERT J [US]

Classifications  
IPC G01S1/00; G01S19/19; G08B13/14;  
CPC B60R9/04 (EPUS); B60R9/10 (EPUS); G01S1/68 (EPUS);

Priorities US40516709A-2009-03-16; US6972608P-2008-03-15  
Application US40516709A-2009-03-16  
Publication US2009256707A1-2009-10-15

Published as US2009256707A1

EN

DEVICE AND METHOD TO PREVENT DAMAGE TO OBJECTS MOUNTED ON TOP OF AUTOMOBILES

Abstract

The invention, a device and method to prevent an automobile with an object on the roof rack from entering a garage, has three main components. The first component is the detector. It is mounted on a roof style bike rack. When a bicycle is mounted on the rack, it activates a switch on the detector, causing the detector to emit a radio signal. The second unit is the proximity transmitter. It is mounted on a sensor the garage door. The proximity transmitter emits a continuous signal. The third unit is the





cbt all "car door" AND (cbt all "bike?" OR cxt all "bicycle?") AND cxt all "proximity sensor?"

Home > Results > WO2019043446A1

Query language: en de fr

AND + Field

- Title, abstract or claims all → Group
  - car door
- OR + Field
  - Title, abstract or claims all → Group
    - bike?
  - Title, abstract or claims all → Group
    - bicycle?
  - Title, abstract or claims all → Group
    - proximity sensor?

Search Reset

### 24 results found

List view Text only List content All Sort by Relevance

- (# patents selected) Select the first 24 results
- WO2018049430A2 (A3) • 2018-03-15 • INTEGEM INC [US]  
Earliest priority: 2016-08-11 • Earliest publication: 2018-03-15  
Disclosed herein are methods and systems for an intelligent, interactive, and augmented reality (AR) based user interface platform. The platform can be implemented in many applications, such as providing real-time intelligent and interactive control between user
- 17. INTELLIGENT INTERACTIVE AND AUGMENTED REALITY BASED U...  
US10957083B2 (A1) • 2021-03-23 • INTEGEM INC [US]  
Earliest priority: 2016-08-11 • Earliest publication: 2018-06-14  
Disclosed herein are methods and systems for an intelligent, interactive, and augmented reality (AR) based user interface platform. The platform can be implemented in many applications, such as providing real-time intelligent and interactive control between user
- 18. A METHOD AND APPARATUS FOR COLLECTING AND USING SEN...  
WO2019043446A1 • 2019-03-07 • NNG SOFTWARE DEV AND COMMERC...  
Earliest priority: 2017-09-04 • Earliest publication: 2019-03-07  
... detected by a sensor in a vehicle. The sensor data is sent periodically, or upon detecting the anomaly, to a... license plate number) and its GNSS or GPS geographic location. The server analyzes the sensor data, and in response sends ...
- 19. METHOD, APPARATUS, AND SYSTEM FOR HUMAN IDENTIFICATIO...  
US2020064444A1 • 2020-02-27 • ORIGIN WIRELESS INC [US]  
Earliest priority: 2015-07-17 • Earliest publication: 2020-02-27  
Methods, apparatus and systems for monitoring an object expression are described. In one example, a described apparatus in a venue comprises a receiver and a processor. The receiver is configured for: receiving a wireless signal from a transmitter through a wireless
- 20. PROGETTO STRADE SICURE TRAMITE SCATOLA NERA E SISTEMI...  
ITCL20070007A1 • 2008-08-15 • BARBERA ANTONINO

### WO2019043446A1 A METHOD AND APPARATUS FOR COLLECTING AND USING SENSOR DATA FROM A VEHICLE

Bibliographic data

Register Global Dossier

Applicants: NNG SOFTWARE DEV AND COMMERCIAL LLC [HU] +  
Inventors: KERECSEN TAMAS [HU] +

Classifications: G08G1/00; G08G1/16;

CPC: G05D1/0287 (EP,US); G07C5/008 (US); G08G1/096716 (US); G08G1/096725 (US); G08G1/096775 (US); G08G1/164 (EP,US); G08G1/205 (EP,US); G05D2201/0213 (US); G07C5/008 (EP);

Priorities: US201762553936P-2017-09-04  
Application: IB2018000804W-2018-07-25  
Publication: WO2019043446A1-2019-03-07

Published as: CN111149141A; EP3652721A1; US2020294401A1; WO2019043446A1

EN FR

A METHOD AND APPARATUS FOR COLLECTING AND USING SENSOR DATA FROM A VEHICLE

Abstract

A road hazard, such as a traffic collision, traffic regulation violation, road surface damage, or any other traffic obstruction, is detected by a sensor in a vehicle. The sensor data is sent periodically, or upon detecting the anomaly, to a server over the Internet via a first wireless network, together with a vehicle



IPC description as indicated in the relevant CPC symbol - G08G1/16

Classification symbol	Title and description	
<b>G</b>	<b>PHYSICS</b>	
	<b>INSTRUMENTS</b>	
<b>G08</b>	<b>SIGNALLING</b>	
<b>G08G</b>	<b>TRAFFIC CONTROL SYSTEMS</b> (guiding railway traffic, ensuring the safety of railway traffic <b>B61L</b> ; arrangement of road signs or traffic signals <b>E01F 9/00</b> ; radar or analogous systems, sonar systems, lidar systems specially adapted for traffic control <b>G01S 13/91</b> , <b>G01S 15/88</b> , <b>G01S 17/88</b> ; {radar or analogous systems, sonar systems, lidar systems specially adapted for anti-collision purposes <b>G01S 13/93</b> , <b>G01S 15/93</b> , <b>G01S 17/93</b> })	
<b>G08G 1/00</b>	<b>Traffic control systems for road vehicles</b> (arrangement of road signs or traffic signals <b>E01F 9/00</b> {; automatic vehicle control <b>B62D</b> })	
<b>G08G 1/16</b>	<ul style="list-style-type: none"> <li>• Anti-collision systems (road vehicle drive control systems for predicting or avoiding probable or impending collision otherwise than by control of a particular sub-unit <b>B60W 30/08</b>)</li> </ul>	



Home > Results > CN110831812A

Query language: en de fr

AND + Field

Title, abstract or claims all → Group

car door

OR + Field

Title, abstract or claims all → Group

bike?

Title, abstract or claims all → Group

bicycle?

IPC all → Group

G08G

Search Reset

### 40 results found

List view List content Sort by

Text only All Relevance

0 patents selected Select the first 40 results

14. Quick car returning method based on shared car  
CN111563803A (B) • 2020-08-21 • BEIJING SHOUQI ZHIXING TECH CO LTD  
Earliest priority: 2020-05-13 • Earliest publication: 2020-08-21  
...The invention relates to a quick car returning method based on a shared car. The quick car returning method comprises... bicycle return website selected by the current user supports a quick bicycle return function; a condition 2, the number of... auditing is passed, allowing to

15. Shared bicycle flowing system and automatic scheduling system an...  
CN111598481A • 2020-08-28 • UNIV SHANDONG JIAOTONG  
Earliest priority: 2020-05-26 • Earliest publication: 2020-08-28  
...The invention provides a shared bicycle flowing system and an automatic scheduling system and method based on sub-region division. The shared bicycle flowing system comprises overground conveying devices arranged at bicycle taking and placing points

16. Anti-collision system for preventing vehicle from colliding with vehicl...  
CN110831812A • 2020-02-21 • ZHOU ZHAOKAI  
Earliest priority: 2019-10-09 • Earliest publication: 2020-02-21  
...The invention relates to an anti-collision system for preventing a vehicle from colliding with a vehicle door. The system... vehicle driver can judge whether the front vehicle door needs to be opened or not in advance, and passengers on the vehicle can know the existence of the

17. Intelligent machine garage import and export vehicle access conditio...  
CN207281487U • 2018-04-27 • SICHUAN ZHITAI AUTO PARKING CO LTD  
Earliest priority: 2017-10-20 • Earliest publication: 2018-04-27  
... utility model provides a current machinery vehicle storehouse all badly cooked with user experience when picking up the car in the bicycle parking, thereby during the bicycle parking driver can't know those parking rooms very directly perceived and in advance can the

☆ CN110831812A Anti-collision system for preventing vehicle from colliding with vehicle door

Available in Patent Translate

Bibliographic data

Instead of «proximity sensor»

40 results vs. 24



Home > Results > CN216734065U

Query language: en de fr

AND + Field

Title, abstract or claims proximity

car door

< 3 words away from

open\*

Title, abstract or claims all

anti-collision system?

Search Reset

### 45 results found

- List view Text only List content All Sort by Relevance
- (0 patents selected) Select the first 20 results
- 1. Anti-collision car door delayed opening system and control system th...**  
 CN107083882A (B) • 2017-08-22 • UNIV XIAMEN TECHNOLOGY  
**Earliest priority: 2017-05-25 • Earliest publication: 2017-08-22**  
 ...The invention discloses an anti-collision car door delayed opening system. The anti-collision car door delayed opening system comprises..., the system can make the car enter a car door delayed opening protection pattern, and thus car door anti-collision protection...
  - 2. Automobile door opening anti-collision intelligent warning system, me...**  
 CN111775834A • 2020-10-16 • ZHEJIANG TONGSHAN ARTIFICIAL INTELL...  
**Earliest priority: 2020-06-27 • Earliest publication: 2020-10-16**  
 ...The invention relates to an automobile door opening anti-collision intelligent warning system, a method and equipment and a storage medium. The automobile door opening anti-collision intelligent warning system is composed of external cameras, distance sensors, an
  - 3. Automatic anti-collision device for door opening of automobile**  
 CN216734065U • 2022-06-14 • NANJING ENG COLLEGE  
**Earliest priority: 2022-01-13 • Earliest publication: 2022-06-14**  
 The utility model provides an automobile door opening automatic anti-collision device which comprises a controller, the signal input end...
  - 4. Automobile door opening anti-collision system**  
 CN21552850U • 2022-01-18 • XIAN ZHONGNUO COMMUNICATION CO ...  
**Earliest priority: 2021-06-18 • Earliest publication: 2022-01-18**  
 The utility model provides an automobile door opening anti-collision system which comprises a controller, and an ambient light detection...
  - 5. Automobile door opening anti-collision system**  
 CN113043994A • 2021-06-29 • ZHEJIANG POLICE COLLEGE

☆ CN216734065U Automatic anti-collision device for door opening of automobile Patent Translate

**Bibliographic data**

Applicants: NANJING ENG COLLEGE +  
 Inventors: CHEN YIFAN; YANG BIN; LIU GUOQING; LU YING +

Classifications  
 IPC: B60Q9/00; B60R21/01; E05F15/73;

Priorities: CN202220075954U-2022-01-13  
 Application: CN202220075954U-2022-01-13  
 Publication: CN216734065U-2022-06-14

Published as: CN216734065U

EN ZH

Automatic anti-collision device for door opening of automobile

Abstract

The utility model provides an automobile door opening automatic anti-collision device which comprises a controller, the signal input end of the controller is connected with the signal output end of an A/D converter, the signal output end of a driving state collecting module and the signal output end of a power source, and the signal output end of the controller is connected with an automobile lock switch and an early warning module. The signal input end of the A/D converter is connected with the signal output end of the pressure sensor and the signal output end of the millimeter wave radar. The device solves the problem that when an automobile is parked, a passenger opens an automobile door without paying attention to an automobile coming behind the automobile side, so that traffic accidents



worldwide.espacenet.com

Anticipate Th...erent humor. Espacenet - Home page Associazione...itroconsumo HDblog.it La T...a Definizione Login - ARCA SGR Google Wikipedia Facebook Twitter Italia | LinkedIn IPWatchdog.c... & Patent Law Kluwer Patent Blog GermanIP Written Description Dizionario It...eference.com IP finance

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Office/Language

Feedback

xx/distance<3 "open\*") AND ctxt all "anti-collision") OR (ctxt=("car door" prox/distance<3 "open\*") AND cl all "G08G")

Home > Results

Query language: en de fr

OR + Field

AND + Field

Title, abstract or claims all

car door

OR + Field

Title, abstract or claims all

bike?

Title, abstract or claims all

bicycle?

Title, abstract or claims all

proximity sensor?

Search Reset

189 results found

List view Text only List content All Sort by Relevance

(0 patents selected) Select the first 20 results

1. DEVICE AND METHOD TO PREVENT DAMAGE TO OBJECTS MOUN...  
US2009256707A1 • 2009-10-15 • No applicant available  
Earliest priority: 2008-03-15 • Earliest publication: 2009-10-15  
... garage, has three main components. The first component is the detector. It is mounted on a roof style bike rack... a radio signal. The second unit is the proximity transmitter. It is mounted on or near the garage door. The... visual alarm that warns the driver he is

2. Method for securing exit process of person from motor vehicle i.e. pas...  
DE102012021249A1 (B4) • 2014-05-28 • AUDI AG [DE]  
Earliest priority: 2012-10-30 • Earliest publication: 2014-05-28  
...The method involves determining whether a person (12) intends to step out of a vehicle (10) through a vehicle door... object (18) e.g. past bicycle rider, and an exit intention of the person are signaled by the control device... in a door lever (28) of the vehicle door and a

3. Order and meal delivery system for restaurant automatic services  
CN107758248A • 2018-03-06 • LI HESHUN  
Earliest priority: 2017-10-11 • Earliest publication: 2018-03-06  
... automatic order and meal delivery equipment. The system comprises a road table, an electric car, an order receiving box DT and an automatic control unit; the electric car comprises a meal delivery car and an order delivery car, the meal... meal delivery car console

4. Novel passenger car door opening anti-collision active early warning s...  
CN113335181A • 2021-09-03 • SHANGHAI AGILTY INTELLIGENT TECH C...  
Earliest priority: 2021-03-19 • Earliest publication: 2021-09-03  
...The invention discloses a novel passenger car door opening anti-collision active early warning system based on a relay, which... relay module, a car door controller and a door lock motor, the DVL main controller is provided with a power... relay-based novel passenger car

5. Information transfer system for charging electric bicycles

(ctxt all "car door" AND (ctxt all "bike?" OR ctxt all "bicycle?") AND ctxt all "proximity sensor?") OR (ctxt all "car door" AND (ctxt all "bike?" OR ctxt all "bicycle?") AND ipc all "G08G") OR (ctxt=("car door" prox/distance<3 "open\*") AND ctxt all "anti-collision") OR (ctxt=("car door" prox/distance<3 "open\*") AND cl all "G08G")

[https://documents.epo.org/projects/babylon/eponet.nsf/0/8C12F50E07515DBEC12581B00050BFDA/\\$File/espacenet-pocket-guide\\_en.pdf](https://documents.epo.org/projects/babylon/eponet.nsf/0/8C12F50E07515DBEC12581B00050BFDA/$File/espacenet-pocket-guide_en.pdf)



Start small, expand carefully

Start using very specific words in title and abstract

Expand the search using synonyms and classes to increase recall

Use the full text to complete the search

Analyze the **drawings, title, abstract** and then **claims** and **full text**

When you find a relevant patent, search for **cited** and **citing documents**

Search on **more than one database**



- The basics of patent searching  
<https://www.sciencedirect.com/science/article/pii/S017221901630103X>
- Patent prior art searches: basic principles and strategies  
<https://www.preprints.org/manuscript/202205.0054/v1>



Thank

ANY  
QUESTIONS  
?

You

