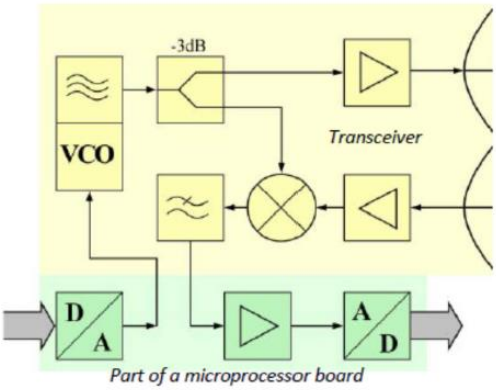
PROXIMITY SENSOR FOR A PARKING AREA

Main technological area ⟶ Continous Wave Radar / FMCW

Keyword ⟶ Parking Areas / Traffic control systems / Vehicles/ Proximity Sensors / Frequency Modulated Continuous Wave type (FMCW)

Proximity sensor for a parking area which can detect the presence of an obstacle (parked vehicle), based on continuous wave radar.
Includes a transmitter that sends electromagnetic pulses to the obstacle, a receiver that receives the reflected wave from the obstacle and a processing circuit designed to compare the samples detected in an obstacle-free condition, during the calibration phase, with the pulses detected in the operational phase.



TECHNICAL FEATURES

The sensor includes

- Radar , composed by
  - Transmitter, which operates in standard mode to produce a Triangular (sawtooth) frequency modulated signal
  - Receiver
  - A/D Converter
- A processing module for the received signals
- The Calibration Module, that can store a series of samples, received in the absence of obstacle

After the calibration phase, when the signals received in the absence of an obstacle are collected and stored, the sensor goes into operation.
During this phase the sensor implements a detection algorithm, based on the comparison between received signals and signals stored during the calibration phase. In the absence of an obstacle, the signals received will be comparable to those received during the calibration phase stored during calibration. If there is an obstacle, the signals received will be greater. The sensor detects the presence of an obstacle if the received signal is higher than a certain adaptive threshold. The threshold is updated by means of a suitable algorithm that exploits the measured values.

LEONARDO

PATENT BROCHURE

INNOVATION/BENEFITS

i. *Production costs of the radar sensor are not high:*
   - *Continuous Wave Radar has a lower production cost than a pulse equivalent*
   - *the processing system (as a result of references in the time domain rather than in the domain of the*
   - *frequency) must manage a lighter calculation algorithm, streamlining hardware resources and reducing energy consumption by the sensor*

ii. *Ability to detect both bulky vehicles (cars, caravans, coaches, etc..) and mass vehicles more contained (motorcycle, bike) even if not placed on top of the sensor itself*

iii. *Enables the definition of parking management policies based on the type of vehicle detected by the radar*

AREAS OF USE

Smart Cities	*Management of various types of vehicle parking. Management of parking lots at airports, stations, industrial plants, military bases, stadiums*

PATENT INFORMATION

Data di Priority Date -2009/04/01

Priority Number - *IT2009TO0251*

IPC Codes – *G01S13/34 G01S13/93 G01S7/292 G01S7/40*

Active Worldwide Extensions

EPO - EP2237062B1; Filing Date: 2010/03/31 Grant Date 09/05/2012

Italy – France – Germany - United Kingdom

USA US8164508 ; Filing Date: 2010/04/01 ; Grant Date 24/04/2012

Leonardo internal code

LDO-0215

Leonardo References

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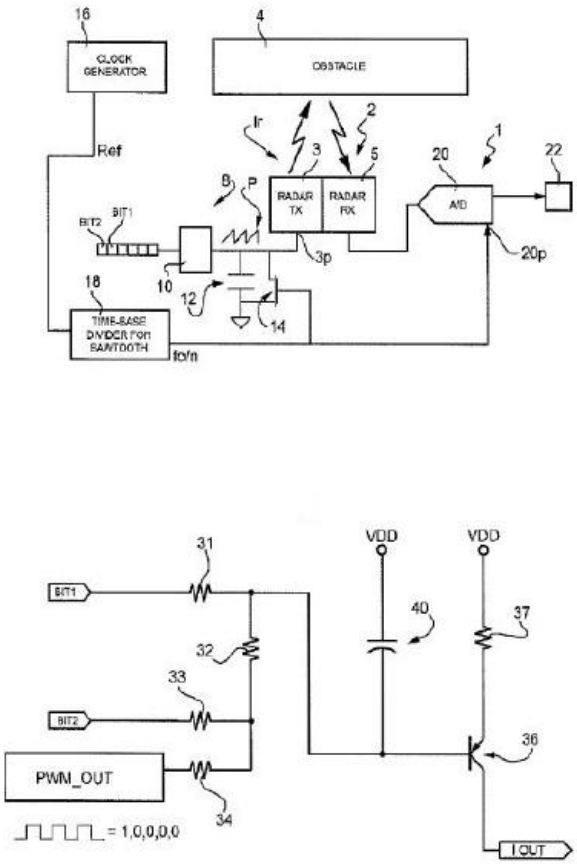

Figure 1 System Overview

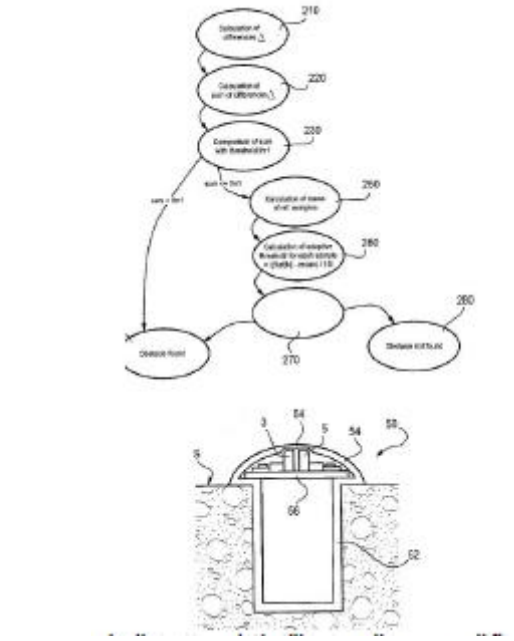

Figure 2 Sample data structure used and operational flow chart