

## COLLABORATIVE IMPROVEMENT OF A VEHICLE'S POSITIONING

### Technological advantages

#### Innovative :

- Use a set of absolute GNSS positions from various rovers and relative positioning to enhance a rover positioning.

#### Efficient :

- Does not require specific complex hardware
- May use direct rovers connections or use an infrastructure.

### Invention synthesis

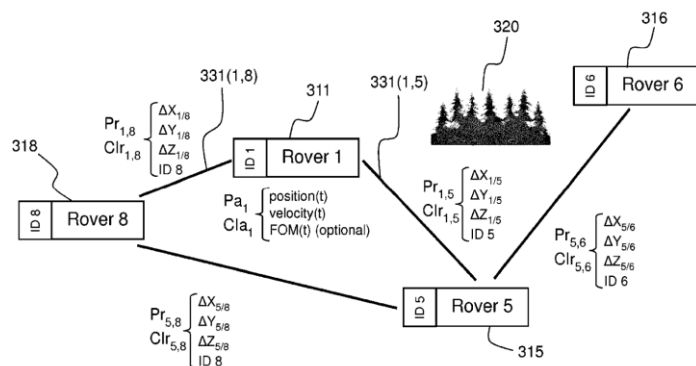
The invention deals with collaborative positioning for rovers exchanging relative and absolute positions.

GNSS receivers have a high metric accuracy when many satellites are in direct line of sight. From the satellites signals, pseudo-ranges can be computed and the position, time, velocity (PVT) data can be calculated. Signal degradation (atmospheric perturbations, multi-path reflections, natural or artificial masking) may severely impair positioning (e.g. urban canyons). Attempts for vehicle to vehicle communication using RF or LIDAR sensors are complex (dedicated hardware, no information on measurement availability or integrity).

The invention presents a system where vehicles exchange relative and absolute time-stamped positioning as well as associated confidence indexes using a communication link. The first location is taken only from the onboard GNSS, a second location is from a best fit between a first geometry from absolute GNSS values (including near rovers) and a second geometry from the relative positioning of rovers. An algorithm can then evaluate the rover positioning (geometric calculations including confidence levels).

### Potential applications

- Professional or civil applications. All connected GNSS receivers : road navigation (cars, buses, trucks...). Autonomous cars.



**Schematic of a functional architecture with a rover to rover direct / indirect communication**

- (311) Rover 1 in line of sight (LOS)
- (315) Rover 5 in LOS
- (318) Rover 8 in LOS
- (316) Rover 6 NOT in LOS with rovers 1, 8
- (320) Masking obstacles

### Commercial benefits

- Collaborative approach, enhanced positioning accuracy, known confidence level.
- Better road navigation. Enhanced safety.

*Patented invention - under license.*