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PATENT BROCHURE

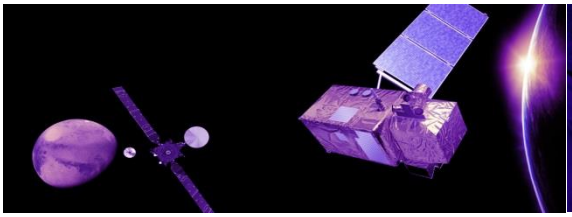
METHOD FOR TRANSMITTING NUMERIC VALUES FROM A DETECTION UNIT TO A CONTROL UNIT

Main technological area ⟶ Telecommunication/Telemetry/Remote Control

Keyword ⟶ Telecommunication | Telemetry |Remote Control | Sensor | Coding Algorithm

Method to optimize the transmission of numerical values from a detection unit to a control unit by reducing the number of transmitted binary digits, obtained by choosing the optimal coding run-time based on the measured value, the previous values and the selection of the acquisition time slot.
The detection unit can be composed of one or more sensors, a processing unit, volatile memory and non-volatile memory. The transmission medium can be the free space or a network of conductors. The detection unit that acquires numerical values can work synchronously and / or asynchronously. The control unit is able to transmit control signals and selection of sensors and acquisition modes. The detection unit and the control unit must be synchronized over time.
The method consists of

1) Binary encoding of the measured value according to different coding algorithms
2) Storage of the different codes in tables
3) Coding of the time of acquisition
4) Generation of a first sequence of code and a second sequence of code formed, respectively, by the first and second stored codes
5) Selection of an optimal algorithm among those used
6) Generation of a sequence of data based on the optimal algorithm
7) Data transmission to the control unit



TECHNICAL FEATURES

This solution is applicable in any data transmission scenario between a remote control unit and one or more detection units including sensors capable of measuring some physical parameter. Detection units include a processing unit that executes algorithms, volatile and non-volatile memories and TX/RX equipment capable of transmitting data and receiving commands remotely. Any mean of transmission can be used (Figure 1**Errore. L'origine riferimento non è stata trovata.**).
Figure 2 shows the data structure used to store the partial data (Primary Table, Secondary Table, Time Offset Table).
Figure 3 shows the flowcharts of the steps performed by the algorithms.
The control unit may require periodic (synchronous) or one-shot (asynchronous) measurements.
Each request of the control unit identifies a measurement session

After the measurement, the values acquired by the sensors are coded in three different ways:

1) Minimum-value Algorithm
2) Differential Algorithm i.e. the difference between the current measurement and the previous measurement is coded
3) Algorithm of the nominal value, i.e. the difference between the current measurement and an average reference value is coded, for example the statistically most probable value.

Such algorithms produce codes of different lengths.
In addition, differential type algorithms can produce exception values, coded appropriately, in the case of first acquisition.

A reduction in the number of digits transmitted is obtained by selecting the code that produces the smallest number of bits on a single value.

These data must also be sent to the control unit

- data relating to the encryption algorithm used
- the session identifier contained in the request message
- a code that identifies the algorithm used for the encoding;
- The type of acquisition (synchronous or asynchronous)

Figure 2 shows an example of the data structures used, taking into account the different coded values for the various measurements.
Figure 3 contains the steps performed by the system to compose the optimized strings to be transmitted.

INNOVATION/BENEFITS

Benefits:

- - Reduce the volume of data transmitted, without loss of information.
- - Optimize the use of the transmission channel

AREAS OF USE

Satellite	Satellite data transmission systems
Control Centers	Controllo remoto sensori, Controllo Centraline di misura
Remote Sensing	Remote control of sensors, Control of measuring units

PATENT INFORMATION

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Italiy – France – Spain – Turkey – Nederland – United Kingdom

Leonardo internal code
LDO-0188

Leonardo References
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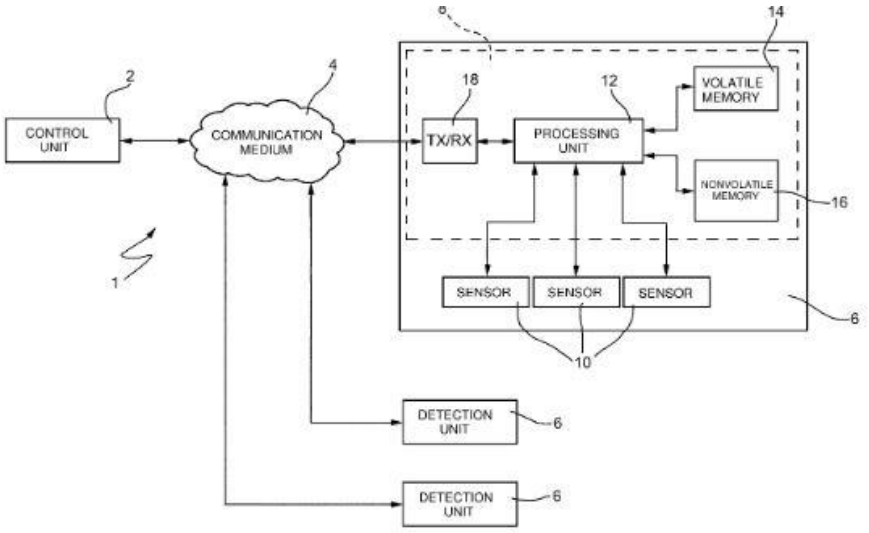

Figure 1 General system diagram

SLOT IDENTIFIER	TIME VALUE	TYPE	PARAMETER	ALGORITHM 1	ALGORITHM 2
1	15:20.00	C	5.2	0x34 (52)	0xFB0034FF (52)
2	15:21.00	C	5.2	0x34 (52)	0x00 (0)
	15:21.12	R	5.3	0x35 (53)	0x01 (1)
	15:21.27	R	5.4	0x36 (54)	0x01 (1)
3	15:22.00	C	5.4	0x36 (54)	0x00 (0)
4	15:23.00	C	5.4	0x36 (54)	0x00 (0)
5	15:24.00	C	5.4	0x36 (54)	0x00 (0)
6	15:25.00	C	5.4	0x36 (54)	0x00 (0)
	15:25.10	R	5.7	0x39 (57)	0x03 (3)

Figure 2 Sample data structure

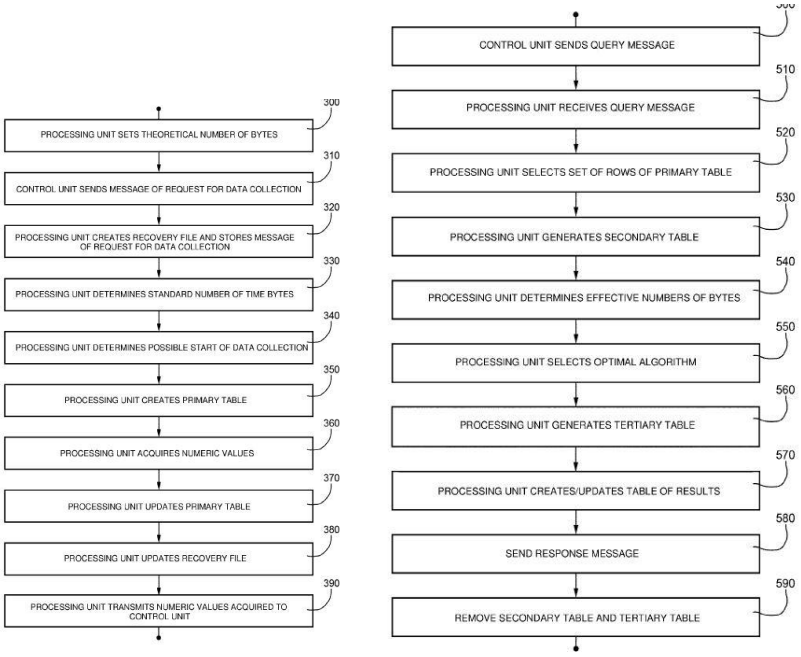

Figure 3 Flow charts