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(71) Applicant: **Volker Stevin Rail & Traffic BV**
4131 NL Vianen (NL)

(72) Inventors:
- **Adema, Edwin John**
  7201 VC Zutphen (NL)
- **Wanders, Vincent Emiel**
  7425 GC Deventer (NL)

(74) Representative: **Assendelft, Jacobus H.W.**
Keukenhofdreef 20
2161 AZ Lisse (NL)

(54) Railway signalling system

(57) Railway signalling system with sensors detecting the presence or passage of a train, such as shaft counters, of a remote computer within a relais house which is connected to the computer of the railway traffic control centre; wherein the computer in the relais house is provided with a malfunction forecast system; and/or wherein there are wire less communication means to be able to receive at a distance from the relais house data from the computer in the relais house.

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Description

DISCLOSURE OF THE PRESENT SITUATION

[0001] A railway for people or goods transport is typically equipped with sensors detecting the presence or passage of a train for railway traffic processing in an efficient and safe semi- or complete automatic manner. An example of such sensors are the so called shaft counters, with which a track crossing security device is automatically controlled. Per sensor type all such sensors belonging to a particular railway part are through leads connected to one or more computers within a so called relais house. All computers in relais houses within a specific area are connected through leads to the computer of the railway traffic guidance centre. Thus the cenral railway traffic guidance centre continuously receives updated data about the railway traffic situation along the railway network, e.g. with an image of the track sections occupied by trains.

[0002] The computer in the relais house continuously checks its connected network of sensors for errors in the signals received therefrom. E.g. with a shaft counter a permanent magnetic field disturbance can be developed, e.g. in that an iron part dropped onto the shaft counting head. Also the connection between the sensor and the computer (e.g. a modem) can become out of order. Once a defect is determined, the computer each time decides if there is a malfunction. In that case the computer in the relais house sends a malfunction message to the traffic control centre.

[0003] At present the situation is that the central traffic control has no power to immediately determine the nature of the malfunction from the malfunction message. Therefor it is typical practice that from the railway traffic control centre the relevant part of the railway is made inaccessible, and a mechanics travels to the relevant relais house to investigate the relevant computer to determine the nature of the malfunction. Subsequently the mechanics travels to the location along the railway with the possible defect (to a sensor of other railway component, such as an electrical separation weld) and then back to the relais house to look if the malfunction is now solved. If not, the mechanics again has to travel to a location along the railway and than again has to return to the relais house, and this possibly several times until the malfunction is solved.

DISADVANTAGES OF THE PRESENT SITUATION

[0004] It should be clear that this manner of solving a malfunction is costly, laborious, labour intensive and slow. Beside the slow manner in which the malfunction is solved causes additional disadvantages because in the mean time the railway traffic is not or restrictive possible. In that connection one should keep in mind that the distance between the relais house and a sensor connected thereto can measure 5 km or more, and the sensor can be present at a location, e.g. within a forest of agricultural area, which is only accessible through the railway. These circumstances largely contribute to the slowness with which a malfunction is solved.

OBJECT OF THE INVENTION

[0005] The object of the invention is to partly of completely solve one or more of the above disadvantages of the prior art. Therefor a monitoring system is proposed.

FIRST ASPECT (data retrieval through GSM)

[0006] According to a first aspect of the invention it is suggested that through wire less communication means, preferably active on the basis of a cellular network, such as GSM, one or more of the data that are available in the computer in the relais house can be received from the computer within the relais house at a distance therefrom. It that way it is no longer required that a mechanics visits the relais house for solving a malfunction. The mechanics has furthermore the power to immediately at the location of a sensor determine on his own of the malfunction is solved by a repair thereof. In this way the malfunction afhandeling can be much faster.

[0007] According to a prefered embodiment measurements are taken such that from a remote data input and output means, such as keyboard and monitor through these wire less communication means the computer is called to retrieve the required data therefrom, which the computer subsequently sends to said data input and output means through said wire less communication means. The computer is accordingly programmed. Communication between the wire less communication means and the computer resp. the remote data input and output means can take place with the aid of convenient means, such as a modem.

SECOND ASPECT (malfunction forecast)

[0008] According to a second aspect of the invention it is proposed to equip the computer in the relais house with a malfunction forecast system, wherein the computer is designed to preferably automatically provide a message signal in dependence of the malfunction forecast system, such that a mechanics receives a message, long, preferably at least one hour, before there is indeed a malfunction determined by the computer.

[0009] In this way the mechanic can carry out focused preventive maintenance to avoid a real malfunction. Thus the availability of the railway can be increased substantially with a relatively limited increase of, or possibly even unchanging railway contro costs.

[0010] Preferably said malfunction forecast system is desigend such that the malfunction forecasts made by the computer are based on one or more defects detect-

ed by the computer within its network of sensors. Thus the preventive maintenance is made dependent of the actual condition of the relating signalling system.

[0011] E.g. said message signal is given when the computer has calculated that, counted from the last determined defect within the signals from the sensors of its network, the occurance of a malfunction message by the computer to the traffic control computer will take place with a predetermined possibility within a predetermined time. E.g. said signal is given by the computer when a malfunction message will be given within 24 hours with a possibility of 95%.

[0012] For this the computer in the relais house can be programmed such that it calculates from the one or more defect in the signals coming from its network of sensors determined by this computer within a predetermined time a malfunction chance value and compares it with a predetermined norm value to give the signal for the malfunction forecast on the basis of said comparison.

COMBINATION OF FIRST AND SECOND ASPECT

[0013] Most preferably the above described first and second aspects are combined. Thus the mechanic, remote from the relais house, receives through wire less communication means, preferably based on a cellular network, such as GSM, the relevant malfunction forecasting message. The message can than reach the mechanic with the least delay.

[0014] It is now also possible that the mechanic after receiving the message remotely determines the nature of the malfunction and subsequently travels immediately to a location along the railway, and not first to the relais house. After the mechanic has carried out the maintenance work along the railway, he can immediately check the result of his labour to the condition of the relating signalling system by making from that location wire less contact with the computer in the relais house through the wire less communication means and decide for further work, possibly at another location, on the basis thereof. In this way traveling up and down to the relais house is avoided, and also the corresponding time loss, costs, etc.

[0015] By combining the first and second aspect of the invention, the mechanic can carry out the preventive maintenance with the highest effectiveness. A surprising combination effect is obtained.

FINAL REMARKS

[0016] The existing computer in the relais house has no permanent memory. When power is shut off (e.g. power malfunction) the historical data collected in this computer thus get lost. By applying wire less communication means according to the invention it is made possible to store such historical data, or other data, in a permanent computer memory remote from the relais house. Thus it is not required, to adapt the computer in the relais house for permanent data storage.

[0017] It will be appreciated that the use of the invention is not limited to shaft counters. Another application is for the track section signalling sensors such as applied for a railway provided with electrical separation welds.

Claims

1. Railway signalling system with sensors detecting the presence or passage of a train, such as shaft counters, for efficient and safe railway traffic processing, which sensors are communicative connected with a remote computer within a relais house which is communicatively connected to the computer of the railway traffic control centre, wherein the computer in the relais house is configured for tracing defects in signals received from the sensors to decide if a defect is determined if a malfunction a present, whereafter the computer gives a malfunction message; wherein the computer in the relais house is provided with a malfunction forecast system, wherein the computer is configured to give a message signal in dependence of the malfunction forecast system, such that a mechanic receives a message long before there is actually a malfunction determined by the computer; and/or wherein there are wire less communication means, preferably in the relais house, preferably active on the basis of a cellular network, such as GSM, to be able to receive at a distance from the relais house data from the computer in the relais house.

2. System according to claim 1, wherein the malfunction forecast system is configured such that the malfunction forecasts provided by the computer are based on one or more defects detected by the computer in its network of sensors.

3. System according to claim 1 or 2, wherein said message signal is given when the computer has calculated that, counted from the last determined defect in the signals from the sensors of its network, the occurance of a malfunction message by the computer to the traffic control computer will take place with a predetermined possibility within a predetermined time, wherein e.g. said signal is given by the computer when there is a possibility of 95% that a malfunction message will be given within 24 hours.

4. System according to claim 1, 2 or 3, wherein the computer in the relais house is programmed such that it calculates from the one or more defects determined by this computer within a predetermined time from its network of sensors a malfunction value and compares it with a predetermined norm value

to give the signal for the malfunction forecast on the basis of this comparison.

5. System according to claim 1, 2, 3 or 4, wherein through the wire less communication means data from the computer in the relais house are sent to and stored in a permanent computer memory remotely from the relais house.

6. System according to claim 1, 2, 3, 4 or 5, configured to communicate through the wire less communication means, e.g. by virtue of a modem, with the computer through remote data input and output means, such as keyboard and monitor, to retrieve therefrom the desired data which the computer subsequently sends to said data input and output means through said wire less communication means, wherein the computer is programmed accordingly.