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TELEMATICS IN SUPERVISION OF MANUFACTURE TRANSPORT DEVICES

The paper is focusing on using telematic in exploitation process of manufacture transport devices. The own solutions of telematics systems in use, dedicated to overhead cranes, have been presented.

TELEMATYKA W NADZOROWANIU PROCESU EKSPLOATACJI ŚRODKA TRANSPORTU BLISKIEGO

Przedmiotem artykułu jest zastosowanie telematyki w środkach transportu bliskiego. Przedstawiono własne rozwiązania w zakresie stosowania układów telematycznych w procesie eksploatacji suwnic pomostowych.

1. INTRODUCTION

One of more essential areas of using telematics is the transportation. Telematics is focusing on information-orientated activities, considering possible restrictions. Rational working on an object (person or cargo) is possible only with using possessed information. Working on the information includes: getting the information from different sources (monitoring), processing the information in a proper way (and an useful way for person who is undertaking decisions), recording the information on digital media types for archival purpose or prognoses (storing), sending the information to interested recipient (transmission), presentation of the information for the decision necessities.

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Using telematics in transportation is the subject of numerous publications, for example [1, 2, 3, 4, 6, 7, 8]. The authors are focused on following problems:

- the identification of cargo or/and the means of transport,
- supporting the decision process in managing means of transport and the special services (in case of unfavorable events, which can menace the exploational safety of the transportation system),
- generating the information in the form of rescue code (in case of danger-event).

Telematics essentially increases the transportation safety, lets optimize the routes of carrying cargos, and in effect, reduce the costs of transportation, as well as enlarge the reliability of transportation systems. The methodology of transportation system modelling using telematics is presented in book [8].

2. TELEMATICS SYSTEMS IN MANUFACTURE TRANSPORT DEVICES

Telematics is also used in manufactuire transport devices: in operation- and serving process. For example, the mobile vehicles [10] the automated guided vehicles (AGV), the racking (RS) machines applied in narrow-aisle systems, and container gantry cranes. There are also well-known systems supervising the functions of Kone lifts, as well as the mobile robots [5].

More and more often, in automated transportation and production systems - the exploitation of means of transport is supported by gaining, processing, transmission and presentation devices, for the control and supervise necessities. The example - block schema of device-operator cooperation is shown on Figure 1. In practice, in transportation-production process, with the participation of n-th number of transport means, a problem of information flow is a complicated process, which needs some special procedures in management area (using the algorithms known in operating research and computer-aided algorithms). The example of information transmission systems between cooperating devices and operators is shown on Figure 2.

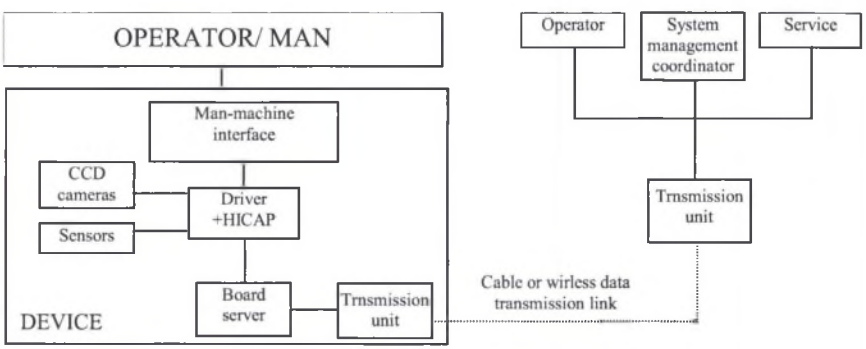

Fig.1. The block schema of joint cooperation of operators with device

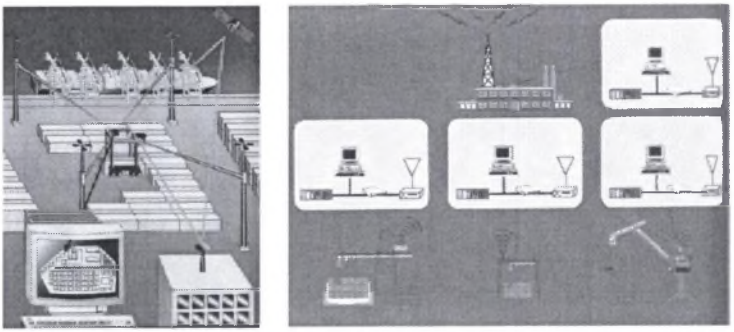

Fig.2. Examples of information transmission systems between co-operating devices and operators

In practice, most of exploited manufacture transport devices include a device and an operator. Remote control systems are not very popular at this moment, because of the safety and the operators' psychophysical barrier, and because of special training required. Now, the operator's cabins are often provided with additional devices which support his decision process. The examples of information panels applied in manufacture transport devices were shown on Figure 3.

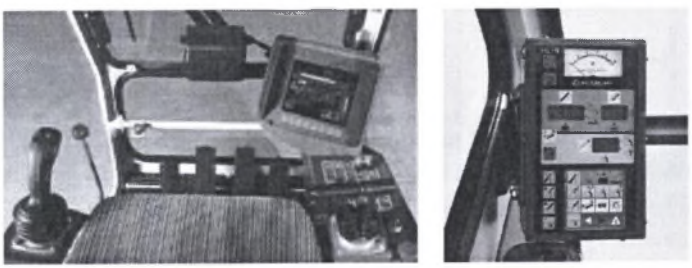

Fig.3. Example of device operator desktops

3. SUPERVISION SYSTEM OF OVERHEAD CRANE EXPLOITATION PROCESS

There was a test of making remote supervising system for overhead crane. The real device, with hoisting capacity Q = 12,5 [t], span L = 16 [m], was equipped with monitoring system of chosen exploational parameters. The informations were transmitted from the sensors installed on the crane, by a wire link, to the computer (Fig.4). The example of operator window was shown on Figure 5.

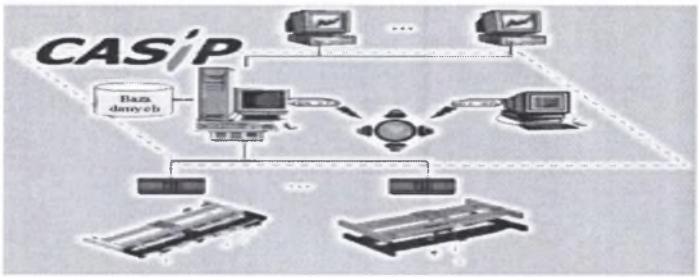

Fig.4. Block schema of crane supervising system (with wire link)

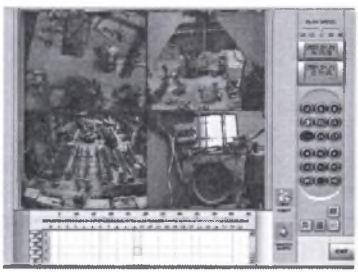

Fig.5. Overhead crane's operator window panel

The electronic platform of monitoring data management and CASIP expert knowledge [9] was included into device exploitation supervising system. The CASIP environment enables the realization of supervising device exploatation preventive-process [8].

For the research of overhead crane remote control system, there was a research station (Fig.6) designed and built in Department of Technological Equipment and Environmental Protection on AGH in Cracow, in Technological Transportation Group. The substantial part of this station was the overhead crane model with hoisting capacity of Q=100 kg. Data from the device and from the environment were transmitted by wire link, by the internet, and by the wireless broadcast. The data transmission system was using the *wi-fi* card (e.g. *Wireless*) with the bandwidth up to 11 Mb/s, in the range of over a dozen meters.

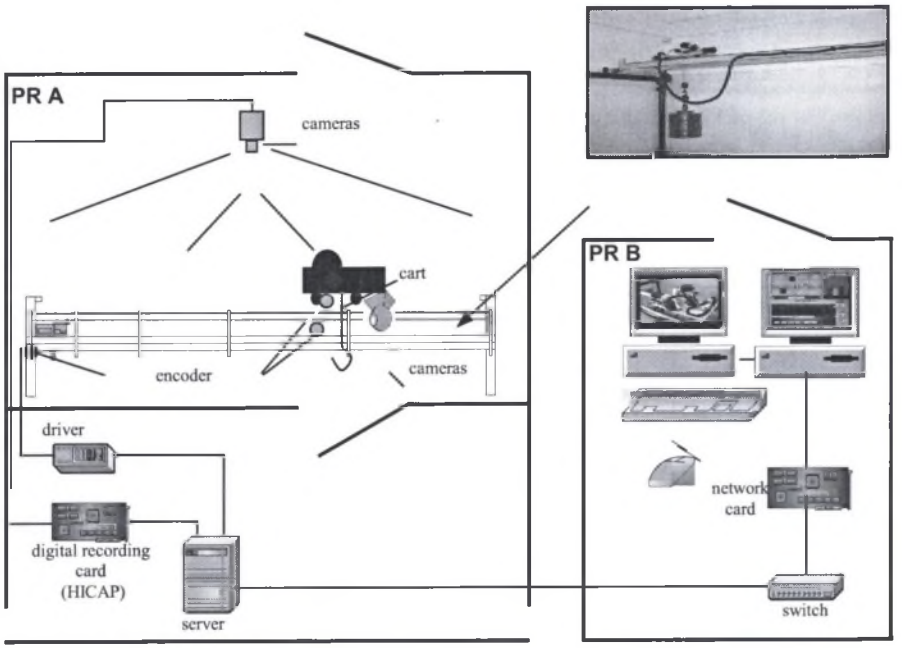

Fig.6. Picture of the research station

The research station (Fig. 6) enables gaining the information about the device environment (by CCD cameras), and about the crane characterized with selected exploational parameters. The device control system and information transmission system include: the driver, digital recording card, local server, switch, network card, and two computers. The process of using the crane is watched from distant room, on the monitors. The operator can control the crane from here.

There are plans to use the station to research the overhead crane exploitation process supported by telematic solutions. The results of this experiment will be published in the following papers.

4. CONCLUSIONS

Using the telematics in transportation allows complying the expectations in: reduction of transport supply management costs, increase of safety and reliability of transportation services, and automation of decision process. Particularly, the challenges for telematics in transportation include:

- technical assurance of communication between units of transportation system,
- building active safety system in distinguished categories of transportation,
- building information gaining systems (and storing the information in database),

- building integrated database gathering cargos, means of transport, environment/ infrastructure data, monitoring/ observing of special cargo transportation (e.g. dangerous materials),
- monitoring of the safety and the duty of transportation infrastructure.

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