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ТЕЗИСТЕР

Халықаралық конференция “Ғылымдағы, техникадағы және білім берудегі есептеулер мен ақпараттар технологиясы”

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ABSTRACTS

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The book contains abstracts of the participants of the International Conference "Computational and Informational Technologies in Science, Engineering and Education". The proceeding of the Conference will be beneficial for specialists in the field of Mathematics and its applications, as well as for students, undergraduates, doctoral students majoring Computational and Informational Technologies.

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direction around the platform.

Another main mission of our development is using robotic platform for bomb disposal and demining. By means of the advanced manipulator, robotic platform can be used in real time transporting and demilitarization of bombs and mines.

Despite of all advances, robotic platform is open to modification and upgrading. Additional equipment, as Geiger counter, can be added for using robotic platform in another scenario. Firmware of robotic platform can be changed for any aim. For now, the platform has built-in controller with functions library that is used to control the behavior of the system. The control of manipulator (robotic arm) is tied with the control of mobile platform into one software with friendly user interface. Operator using Xbox controller through the noted software package can do all remote control operations, and the video transfer exists. As a continuation of the project and as the main part of it, we are planning to enhance the capabilities of the system in self-control by applying the computer vision and path planning mechanisms [3]. Such an algorithms are being developed in our organization, and now the hardware task includes the mounting of additional sensors and computer that is possible to handle such an operations in limited amount of time.

References

[1] Courant, R. and Hilbert, D., *1. International Rescue System Institute: "Special Project for Earthquake Disaster Mitigation in Urban Areas Development of Advanced Robots and Information Systems for Disaster Response"*, Proc. of 5-th international symposium (2006).

[2] Giuk Lee, Junhwan Park, Hwang Kim, Kunchan Seo, Jongwon Kim, TaeWon Seo, *Wall Climbing Robots with Track-wheel Mechanism*, Proceedings of 3rd International Conference on Machine Learning and Computing (ICMLC 2011) (2011).

[3] David S. Touretzky, Ethan Tira-Thompson, *Path Planning*, Lecture at Carnegie Mellon University, Spring 2012.

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Analysis of the possibilities for using a uniform Bragg gratingin a tunable dispersion compensator

The article presents a tunable fibre optic dispersion compensator system, consisting of a specially designedcantilever beam and a uniform Bragg grating. It analyses the group delay and dispersion characteristics in the case that there is no apodization of the gratingand also for a grating with apodization used for modulation of the refractive index. Various apodization parameters were tested, along with their effects on the dispersion characteristics of the entire system properties. It is demonstrated in the paper that the apodization parameter affects the compensator's group delay characteristic. The finite elements method was used to design a compensator of such a shape that enabled chirp to be induced in a grating of a specified shape.A new design is presented for the system, in which the dispersion properties are tuned by the maximum value of the heterogeneous deformation of the compensator. The paper also includes results showing the effect of the maximum value of heterogeneous stress of the grating on the dispersion characteristics of the proposed construction.Communication by means of an optic medium has many advantages, but the main factor limiting its efficiency is dispersion. There are many methods of dispersion compensation. The dispersion compensation fibres in use have a flaw in the form of the compensator's large size [1]. Another disadvantage is the constant length of compensating fibre required for compensation in a fibre optic connection of a specified length, which means that these solutions cannot be applied in networks with optical switching, where the length of the optical connection may vary. Coupled two-cavity allpass filters realised entirely as thin-film structures for dispersion slope compensation of optical fibres have been proposed [2]. Liquid crystals used in optical sensors [3] have also been proposed for the polarization mode dispersion compensation in the Liquid-Crystal Modulator Arrays [4]. Among systems currently used, those based on fibre Bragg gratings are also worth mentioning. The basic flaw of such systems is the fact that the grating of the compensator only works for one wavelength. A solution may be to tune the grating in order to adapt its compensatory properties to a specific wavelength for other requirements, e.g. to obtain a defined scope of group delay.

References

[1] Tewari, R., Basu, M., and Acharya, H. N. *Studying the effect of a central dip on the performance of a dispersion compensated fibre.* Optics Communications 174:405–411. 2000.

[2] Jablonski, M., Takushima, Y., Kikuchi, K., Tanaka, Y., Furuki, K., Sato, K., and Higashi, N. *Layered optical thin-film allpass dispersion equaliser for compensation of dispersion slope of optical fibres.* Electronics Letters 36:1139. 2000.

[3] Gotra, Z., Gotra, O., Mikityuk, Z., Zayats, R., and Stadnyc, B. *Fibre-optic sensors on the base of liquid crystals.* Lightguides and Their Applications, proceedings of SPIE 4239:76–81. 2000.

[4] Akbulut, M., Weiner, A. M., and Miller, P. J. *Broadband All-Order Polarization Mode Dispersion Compensation Using Liquid-Crystal Modulator Arrays.* Journal of Lightwave Technology 24(1):251. 2006.