

<b>Katedra robototechniky – 354 Fakulta strojní VŠB-TU Ostrava</b>	<b>Inovace konstrukcí strojů a zařízení (v oborech fakulty) směřem ke zvyšování výkonnosti, spolehlivosti, úspor energie a ochrany životního prostředí</b>	
	Číslo projektu (smlouvy): <b>CEZ:J17/98:272300008</b>	<b>1999 - 2004</b>
Agentura (objednatel):	MŠMT	Finance (tis.Kč): 16 660
Řešitel	Prof. Ing. Jiří Skařupa, CSc.	
Spoluřešitelé:	doc. Ing. P. Novák, CSc., Doc. Dr. Ing. Vladimír Mostýn, Ing. Adam Tvarůžka, Ing. J. Burkovič, Ph.D., Kárník, CSc, Konečný, Ph.D, Ing. Buzek	
<b>Řešená problematika:</b> <ol style="list-style-type: none"> <li>1. Rozvoj metod, teorie a principů inovací strojních a mechatrických systémů (SMS), subsystémů a prvků <ul style="list-style-type: none"> <li><input type="checkbox"/> Studium, srovnávací analýza a použitelnost stávajících metod</li> <li><input type="checkbox"/> Nové metody a trendy</li> <li><input type="checkbox"/> Metody analýzy a syntézy</li> <li><input type="checkbox"/> Matematické modelování SMS</li> </ul> </li> <li>2. Rozvoj metod a nástrojů počítačové podpory navrhování a optimalizace struktur a parametrů SMS <ul style="list-style-type: none"> <li><input type="checkbox"/> Metody stanovení požadavků (vlastností) SMS</li> <li><input type="checkbox"/> Metody odhadu parametrů a kritérií SMS a jejich souvislostí</li> <li><input type="checkbox"/> Metody počítačové podpory návrhu a hodnocení funkcí a funkčních struktur</li> <li><input type="checkbox"/> Metody a nástroje pro tvorbu koncepčních modelů</li> <li><input type="checkbox"/> Metody a nástroje podpory procesu návrhu modelů sestav a jejich variant</li> <li><input type="checkbox"/> Optimalizace ve fázi návrhu</li> </ul> </li> <li>3. Rozvoj metod a nástrojů pro experimentální, modelové a simulační ověřování výsledků výzkumu a vývoje SMS <ul style="list-style-type: none"> <li><input type="checkbox"/> Simulační metody a nástroje pro fázi ověřování</li> <li><input type="checkbox"/> Optimalizační metody a nástroje pro fázi ověřování</li> <li><input type="checkbox"/> Experimentální metody a nástroje pro fázi ověřování</li> <li><input type="checkbox"/> Aplikace v oborech fakulty</li> </ul> </li> <li>4. Oborové inovační cíle <ul style="list-style-type: none"> <li><input type="checkbox"/> Upřesnění aktuálního stavu a trendů v oborech</li> <li><input type="checkbox"/> Studie průniku metod a nástrojů společně využívaných v oborech fakulty, možnosti zapojení dalších kateder a specialistů</li> <li><input type="checkbox"/> Inovace výrobních a servisních systémů s roboty</li> </ul> </li> </ol>		
<b>Výsledky:</b>  <b>Studie stávajících inovačních metod a možností jejich využití v rámci VZ, nové metody a trendy, metody analýzy a syntézy</b> (monografie)		

## **Matematické modelování mechatronických systémů**

(Monografie)

Identifikace a rozvoj systémů počítačové podpory pro stanovení požadavků a pro kvalifikovaný odhad parametrů SMS

Aplikace a úprava nových metod počítačové podpory návrhu funkcí a funkčních struktur SMS, jejich hodnocení a optimalizace

Rozvoj metod a nástrojů pro tvorbu koncepčních modelů

Metody a nástroje podpory procesu návrhu modelů sestav a jejich variant a optimalizační postupy

Simulace, optimalizace servisních robotů

## **Oborové inovační výstupy - upřesnění aktuálního stavu a trendů v oborech v konfrontaci s dosaženými výsledky – uplatnění SWOT analýzy**

Studie průniku metod a nástrojů společně využívaných v oborech fakulty, možnosti a potřeba zapojení dalších kateder a specialistů

Inovace výrobních a servisních systémů s roboty

Zodpovědný řešitel: Doc. Ing. J. Skařupa, CSc., Dr. Ing. V. Mostýn

Vytvoření komplexní metodiky a „návrhové linky“ pro vývoj produktů a technologií servisní a průmyslové robototechniky

Ověření metodiky a linky na vývoji konkrétního servisního systému

Publikace:

Kárník, L. Possibility use of mobile robots in manufacturing. Časopis VÝROBNÉ INŽINIERSTVO. 2002, roč. 1, č. 2-3, p. 26-28. ISSN 1335-7972-XX.

### **Anotace:**

The paper presents description suitable of the type of mobile robots for manufacturing area in mechanical engineering. From this point of view a basic division of these possible translation modules and manipulation mechanism. A more detailed attention in paid to defined of execute activities with practical samples suitable of the translation modules and manipulation mechanism. The manipulator change on frame chassis we can attain of him universal use for some different of activity.

Kárník, L. The mobile robots on belt chassis for monitoring activities. In Proceedings of International Conference ROBTEP 2002, 22.- 24.5.2002, Prešov. Košice: Sjf TU Košice, s. 175-178. ISBN 80-7099-826-1.

### **Anotace:**

The paper present a summary of the mobile robot on belt chassis of existing construction execute of monitoring activities. The suitable environment for monitoring and requirements

on the construction of this robot in the paper defined. The paper description the designed construction of the mobile robot on belt chassis determination for monitoring environment. Robot is controlled by wireless of operator. The paper concur on previous publication where was presented of analysis of the wheel chassis.

Kárník, L. Use of mobile robots at automatization industrial process. In V. Medzinárodná konferencia: Nové smery vo výrobných technológiách 2002, Prešov. Prešov: Fakulta výrobných technológií TU Košice, 2002, s. 317-321. ISBN 80-70099-828-8.

**Anotace:**

The paper presents description suitable of the type of mobile robots for manufacturing area in mechanical engineering. From this point of view a basic division of these possible translation modules and manipulation mechanism. A more detailed attention is paid to defined of execute activities with practical samples suitable of the translation modules and manipulation mechanism. The manipulator change on frame chassis we can attain of him universal use for some different of activity.

Kárník, L., Buzek, V. The model of four-wheel chassis. In Proceedings of International Conference ROBTEP 2002, 22.- 24.5.2002, Prešov. Košice: Sjf TU Košice, s. 179-182. ISBN 80-7099-826-1.

**Anotace:**

The paper present the design of construction of four-wheel chassis for indoor environment. The chassis have two driven wheels and two wheels without of the drive. Designed of the chassis is determined as translation module of mobile robot for service activity designed. Design construction of the chassis will be solve in Pro/Engineer system. The designed of construction for control in indoor environment will be equipped of the sensor suitable. The paper concur on previous publication where was presented of analysis of the wheel chassis.

Konečný, Z.- Frydryšek, K. Methods of Strength Analyses in Robotic Design. In Proceedings of International Conference ROBTEP 2002, 22.- 24.5.2002, Prešov. Košice: Sjf TU Košice, s. 213-216. ISBN 80-7099-826-1.

**Anotace:**

The CAD/CAM is steel experiencing stormy development and is an important tool of today's engineers in robotics. The requirements of stiffness and mass minimising for robot arms put a large emphasis on the choice of the strength solution methods. There is a lot of software (SW) in which the strength solution can be acquired. Each of them is unique and has its own #strengths# and #weaknesses#. The right choice of SW is sometime complicated and in much cases depends on the price. This paper compares two methods of strength analyses using the #Finite Element Method# (FEM) and the #Geometrical Element Method# (GEM). For FEM was used ANSYS SW and for GEM was used Pro/Engineer.

Mostýn, V., Novák, P. Laser navigation system of the mobile robot. In Proceedings of International Conference ROBTEP 2002, 22.- 24.5.2002, Prešov. Košice: Sjf TU Košice, s. 255-260. ISBN 80-7099-826-1.

**Anotace:**

There is presented a laser navigation system for navigation of the mobile robotic platform in indoor environment in this article. Navigation system is based on the laser sensor LMS221 produced by SICK AG and serves as the main sensor for measuring of the distance from unknown obstacles and provides necessary data for the trajectory planning of the mobile robot.

Mostýn, V., Novák, P., Špička, I. Modeling of the mechatronic systems in MSC/ADAMS environment. In Proceedings of International Conference COMTEP 2002, Košice 30.10.2002. Košice: Sjf TU Košice, s. 53-56. ISBN 80-7099-889-X.

**Anotace:**

In this article are presented possibilities of modeling of mechatronic systems that include mechanical subsystem as well as control and drive subsystems in the whole and possibilities of the investigation of the whole system behavior and interactions among individual subsystems. These facilities are available in #high level# modeling and computing system MSC/ADAMS 12.0 and its plug-in module ADAMS/Controls.

Mostýn, V., Skařupa, J. Computer aided support for the development of mechatronic systems. In Proceedings of the 5th International symposium Mechatronics 2002, 5.-7.6.2002, Gabčíkovo, Bratislava: STU Bratislava, 2002. s. 68-74. ISBN 80-227-1714-2.

**Anotace:**

This article presents new approach to development of the service robots that are for its mechatronic nature with high portion of control demanding on compatibility and interdisciplinarity of the used tools. Here is respected important aspect of engineering system design - complex mechatronic approach to technical solution, when the mechanical subsystem is created concurrently with driving and control subsystems, with optimal allocation of functions among individual subsystems.

Mostýn, V., Skařupa, J., Špička, I. Analysis of the mechanisms with flexible parts. In Proceedings of International Conference COMTEP 2002, Košice 30.10.2002. Košice: Sjf TU Košice, s. 57-60. ISBN 80-7099-889-X.

**Anotace:**

In this article are presented possibilities of modeling of mechanisms with non-rigid bodies using advanced modeling and simulation system MSC/ADAMS and its add-on modules ADAMS/Flex and ADAMS/Tire. These flexible bodies can be parts of moving mechanisms and this approach allow more precise computing of reaction forces and determining of the mechanical system response under external excitation.

Novák, P. Problems of safety assurance of IPC control systems. In Proceedings of International Conference ROBTEP 2002, 22.- 24.5.2002, Prešov. Košice: Sjf TU Košice, s. 275-280. ISBN 80-7099-826-1.

**Anotace:**

Article acquaints wide technical community with some concrete manner security of reliability operation control system based on industrial PC (Industrial Personal Computer - IPC). In the first part article they are outline basic terms concerning about reliability and in the second part they are presented some choices concrete manners with influence on reliability (readiness) control system based on IPC.

Novák, P. Sensors for orientation of mobile robots. In Proceedings of International Conference ROBTEP 2002, 22.- 24.5.2002, Prešov. Košice: Sjf TU Košice, s. 281-284. ISBN 80-7099-826-1.

**Anotace:**

The article describes the basic information about the simple sensors for mobile robot. In the first will be introduced three ultra sonic range finder sonar sensors with analogue and digital outputs. The second will be showed the robot compass module. The all of there described sensors are cheap, available and easy for connecting into control system.

Novák, P. New smart web modules for industrial controls. In Proceedings of International Conference COMTEP 2002, Košice 30.10.2002. Košice: Sjf TU Košice, s. 61-64. ISBN 80-7099-889-X.

**Anotace:**

ADAM-6000, Ethernet-based data acquisition and control module, provides I/O, data acquisition and networking in one module to build a cost-effective, distributed monitoring, and control solutions for a wide variety of industries and applications.

Through de-factor standard Ethernet networking, ADAM-6000 retrieves I/O values from sensors and publishes these real-time I/O value to networking nodes at local area network or Intranet, Internet. With Ethernet-enabled technology, ADAM-6000 series modules build up a cost-effective DA&C system for Building Automation, environmental monitoring, facility management and eManufacturing applications.

Novák, P., Mostýn, V. Sonar SFR08 for mobile robot and their interfacing. In Proceedings of International Conference COMTEP 2002, Košice 30.10.2002. Košice: Sjf TU Košice, s. 65-68. ISBN 80-7099-889-X.

**Anotace:**

The SRF08 is sonar working on ultrasonic frequency 40kHz. The sonar is controlled by microcontroller PIC16F872 and communicates via I2C bus. This module is an evolutionary step from the sonar SRF04 and make full up the other ultrasonic range finder # Polaroid 6500. The sonar can works in special mode, where arrange measured data for Artificial Neural Network.

Novák, P. Safety Assurance of Control systems based on IPC. In Sborník konference AUTOS 2002, Praha, 22.4.-23.4. 2002. Praha: TERIS 2002, s.52-59. ISSN 1213-8134.

**Anotace:**

Article acquaints wide technical community with some concrete manner security of reliability operation control system based on industrial PC (Industrial Personal Computer - IPC). In the first part article they are outline basic terms concerning about reliability and in the second part they are presented some choices concrete manners with influence on reliability (readiness) control system based on IPC.

Mostýn, V., Skařupa, J. Integrated workplace for the development of robotic systems. In Proceedings of the International Conference on Engineering Education – ICEE 2002, 18.-22. August 2002, Manchester U.K.. Manchester: UMIST, 2002. s. 1- 4

**Anotace:**

Under pressure of high demands on engineering solution of technical systems is necessary to apply modern methodical approaches and tools to its design that lead to essential improvement of the quality and shortening of the cycle development # manufacturing.

Presented #software development line# meets all designers# requirements to 3D creation of the parts and assemblies, analysis of the mechanisms and its optimization and offer tools for so-called parallel (concurrent) design, when engineering system and its subsystems are designed concurrently by more subjects, which operate above common database of created product.

Skařupa, J., Mostýn, V. Design specificity of Slender Robots. In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 2, Ostrava: VŠB – TUO, 2003, s. 53 - 60; ISBN 80 – 248 – 0239 – 2

**Anotace:**

This contribution is engaged in the problems solution of the disconnection of secondary movements as a consequence of motors location for the drive of joints of industrial robots out of these joints. In extreme case it is a question of the location of motors for all degrees of freedom of the position and orientation device in the foundation. This variation is used by robots with their slender construction that makes possible their manoeuvres the very limited operating spaces.

Mostýn, V., Skařupa, J., Novák, P. Kinematics of the parallel manipulator. In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 1, Ostrava: VŠB - TUO, 2003, s. 101 - 104; ISBN 80 – 248 – 0239 – 2

**Anotace:**

This article deals with modeling of the kinematics of the parallel kinematic structures for purposes of the position control. There is introduced method of the kinematic analysis for structure with six degrees of freedom in this article and method of computing of required values of position for the individual drives.

Skařupa, J. Means for Support of Engineers Creativeness. In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 2, Ostrava: VŠB - TUO, 2003, s. 43 - 46; ISBN 80 – 248 – 0240 – 6

**Anotace:**

This contribution is engaged in possibilities of the improvement for engineer education, for intensification of their creativeness using CAI (computer aid of invention) systems. It explains the fundamental procedures of the solution theory of innovating problems # TRIZ, which can be used in the scope of TechOptimizer 3.0, with which the students of FS can operate already 3 years It is used during teaching the subjects like, Methodology of construction in mechatronic, Support systems of the creative work, Design of mechatronic systems and in all constructive subjects for the province Manufacturing systems with industrial robots and manipulators. It is placed also in teaching the doctorands and is usually used at the elaboration of diploma works.

Skařupa, J. Integrated Means for Design of Robotic Systems. In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 2, Ostrava: VŠB - TUO, 2003, s. 47 - 52; ISBN 80 – 248 – 0240 – 6

**Anotace:**

The contribution is engaged in actual integrated means for design of service and industrial robotic systems. The application of them is verified at the solution of research tasks on the author's workplace.

Novák, P. Quadrature Sensors and Decoding their Signals. (Senzory s quadraturním výstupem a jejich dekódování) In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 2, Ostrava: VŠB - TUO, 2003, s. 7 - 10; ISSN 1210 – 0471.

**Anotace:**

Article describes decoder of the signal of quadrature sensor. A typical representative are incremental positional sensors uses in mechatronics.

Novák, P., Mostýn, V. Robot Sensor Subsystem with Ultrasonic sensors. (Senzorický subsystém robotu s ultrazvukovými senzory). In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 2, Ostrava: VŠB - TUO, 2003, s. 11 - 16 ; ISSN 1210 – 0471.

**Anotace:**

Article describes a sensorial subsystem of mobile robot based on ultrasonic sonars.

Kárník, L. The Model of Belt Chassis for Practical Instruction in Laboratory. (Model pásového podvozku pro praktickou výuku v laboratoři). In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 1, Ostrava: VŠB - TUO, 2003, s.79 - 84 ; ISSN 1210 – 0471.

**Anotace:**

The paper presents belt chassis, which will be employed for practical teaching in laboratory of the Faculty of Mechanical Engineering - Department of Robotics. The form, function and basic characteristics of chassis design are correspond to the existing trend. The belt chassis will be used in the Department of Robotics laboratory or in outdoor environment, for example urban environment.

Kárník, L., Buzek, V. The Specifications and Analysis of Working Environment for Designed Model of Four-Wheel Chassis. (Specifikace a analýza pracovního prostředí pro navržený model čtyřkolového podvozku). In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 1, Ostrava: VŠB - TUO, 2003, s.85 - 90 ; ISSN 1210 – 0471.

**Anotace:**

The paper presents specifications and analysis on working environment in which the design model of four-wheel chassis can move. They are presentation the basic parameters of chassis and characteristic of obstructions in indoor environment. The chassis must be able to overcome or at them respond from aspect possible of collision. The paper concurs on publication where is presented possibility use design chassis for different applications of concrete activities.

Buzek, V., Kárník, L. Mostýn, V. Use of Design Model Four-Wheel Chassis. (Využití navrženého modelu čtyřkolového). In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 1, Ostrava: VŠB - TUO, 2003, s.17 - 22 ; ISSN 1210 – 0471.

**Anotace:**

The paper presents use of the design construction of four-wheel chassis in laboratory of the Faculty of Mechanical Engineering - Department of Robotics. Chassis is suitable for indoor environment and it is possible use him for different applications of concrete activities. The form, function and basic characteristics of chassis design are correspond to the existing trend. The four-wheel chassis will be used in the Department of Robotics laboratory for practical verification and testing of different functions or teaching purpose too.

Mostýn, V., Konečný, Z., Kárník, L. Modeling of the Dynamics of Industrial Robots with Flexible Links. (Modelování dynamiky průmyslových robotů s pružnými články). In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 1, Ostrava: VŠB - TUO, 2003, s.97 - 100 ; ISSN 1210 – 0471.

**Anotace:**

This article deals with the investigation of the dynamics of industrial robots with flexible links. The method of substitution of the links with the set of rigid elements connected with flexible joints is used for modeling. This method allows investigation of the links deformation during the movement under influence of the dynamical forces.

Konečný, Z., Mostýn, V. Four-Wheel Chassis Parameterization. (Parametrizace čtyřkolového

podvozku). In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Part 1, Ostrava: VŠB - TUO, 2003, s.91 - 96 ; ISSN 1210 – 0471.

**Anotace:**

The possibility of quick changes of engine dimensions in agreement with consumers# requirement is decisive criterion for its marketability very often. The unique determination of single machine parts parameters and their cohesion are the conditions for dimension changes. The system Pro/ENGINEER disposes of tools, which enable parameterization of 3D models. The processing of manufacturing drawing is based on. Within of research project J17/98:272300008 was produced prototype of construction four-wheel chassis, based on 3D model. The full parameterization of 3D chassis model makes possible the dimensional series creation.

Konečný, Z. Bases of part modeling, Václavov u Bruntálu 2003: Workshop 2003, str. 32-34, ISBN 80-248-0526-X

**Anotace:**

The computer technology development affects the design proces of new products. The main a most powerful instrument of the development proces are the CAD/CAM systems. These systems help us to create 3D model of products, for example machines. The basic element of such a model is a simple part. This article deals with modeling of these parts. The terminology used in this article relates to the Pro-ENGINEER system.

KÁRNÍK, L. Usage possibilities of mobile robots with manipulation body in course of production processes automatization. THE INTERNATIONAL MITING OF THE CARPATHIAN REGION SPECIALISTS IN THE FIELD OF GEARS, 5th EDITION, BAIA MARE, MAY, Romania, 2004, pp. 149-154. ISSN 1224-3264.

**Anotace:**

The article presents the description of mobile modules (chassis) with manipulation body for the automatization of production processes. From this point of view their basic classification according to different standpoints is mentioned and the possibilities of practical usage are shown. The more detailed attention is devoted to the description of designed mobile robots with the manipulation body and possibilities their use for concrete applications. We can achieve an universal usage by suitable combination of manipulation body and mobile module.

MOSTÝN, V. - SKAŘUPA, J. Improving mechanical model accuracy for simulation purposes. Journal Mechatronics, Volume 14, Issue 7 , September 2004, GB, Oxford: Elsevier Ltd., 2004, s. 777-787; ISSN 0957-4158

Odborný článek v časopise s impact factorem !!!!!!!

**Anotace:**

In this article, computer aided methods and tools for improving the accuracy of a mechanism#s dynamic model used in the Matlab/Simulink simulation environment are presented. This is done by a simple but exact method with the support of a high-level CAD system Pro/Engineer that allows the analysis of mass properties and the dynamics of complicated spatial mechanisms. These tools can serve for a synthesis of the control system based on Lagrangian dynamics and following a simulation of the whole mechatronic system behaviour.



Novák, P., Králíček, L., Němec, M.: Control of locomotive subsystem mobile robot with omnidirectional wheels. In: Transactions of the VŠB-TU of Ostrava, Mechanical Series, No.1, Ostrava: VŠB - TUO, 2004, pp. 151-159, ISSN 1210 – 0471.

**Anotace:**

This paper describes basic information about depend control of the omni directional mobile robot on omni directional Roller Wheels on desired speed and direction. Electronic compass module is used for detection actual direction. The motion of robot is ensured by three Maxon DC brush motors worked in simple proportional - control loop.

NOVÁK, P.: Omnidirectional mobile robot. In: Transactions of the VŠB-TU of Ostrava, Mechanical Series, No.1, Ostrava: VŠB - TUO, 2004, pp. 147-150, ISSN 1210 – 0471.

**Anotace:**

This paper covers the omni directional mobile robot on omni directional Roller Wheels. This robot was developed on Department of robotics. The robot is calculated for education and research purposes. Main topic of future research will be implementation of AI based on neural nets.

KÁRNÍK, L. The model of manipulation mechanism for practical instruction in laboratory. In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Ostrava: VŠB - TUO, 2004, pp. 77-82; ISBN 80-248-0654-1, ISSN 1210-0471.

**Anotace:**

The paper presents manipulation mechanism, which will be employed for practical teaching in laboratory of the Faculty of Mechanical Engineering - Department of Robotics. The form, function and basic characteristics of construction design are correspond to the existing trend. The manipulation mechanism will by used in the Department of Robotics laboratory or in outdoor environment at placed on wheel or belt chassis, for example urban environment.

KÁRNÍK, L. – BUZEK, V. The joint manipulation mechanism for mobile service robot. In: Transactions of the VŠB – Technical University of Ostrava, vol. XLIX, Mechanical Series, No.1, Ostrava: VŠB - TUO, 2004, pp. 83-86; ISBN 80-248-0654-1, ISSN 1210-0471.

**Anotace:**

The paper presents joint manipulation mechanism, which will be employed for fixing on four wheel chassis with exploitation for measurement and testing in laboratory of the Faculty of Mechanical Engineering - Department of Robotics. The form, function and basic parameters of construction design are correspond to the existing trend. The joint manipulation mechanism will by used in indoor or outdoor environment for practice of service tasks with a view to manipulation with subjects.

Novák, P., Mostýn, V., Kárník, L., Tvarůžka, A. Distributed control system for autonomous mobile robot. In: Proceedings of International Conference Robtep 2004 Vyšné Ružbachy, Slovak Republic, 19. - 21. 5. 2004, pp.332-337, ISBN 80-8073-134-9

**Anotace:**

This paper describes a control system of autonomous mobile robot, which was designed for education purposes at laboratories of the Department of Robotics at the Technical University of Ostrava. The main objective of this control system is to ensure data acquisition of sensor subsystem, and its analysing, tools for autonomous behaviour and operating of actuators. The control must be able to offer quite high computing power, because it realizes analysing of sensor data with the help of the Neural Networks. Sensor subsystem consists of sonars, digital compass, 2D laser scanner (Lidar), cameras, IRC quadrature decoders and so on.

Tvarůžka, A., Novák, P. Robot map building by matching the laser scans. In: Proceedings of International Conference Robtep 2004 Vyšné Ružbachy, Slovak Republic, 19. - 21. 5. 2004, pp.546-549, ISBN 80-8073-134-9

**Anotace:**

This article deals with creating consistent maps from laser scans obtained from the Sick LMS200 laser scanner. The principle of the sensor function is described here. The main approaches of the maps creation by matching the laser scan are discussed and a more detailed procedure which uses the angle histograms is also proposed here.

MOSTÝN, V., SCHINDLER, P., KÁRNÍK, L., NOVÁK, P., SKAŘUPA, J. Application of the robust control algorithms to the position servosystems of robots. In: Proceedings of RAAD'04, 13th International Workshop on Robotics in Alpe-Adria-Danube Region, Brno June 2-5, 2004, s. 77-81; ISBN 80-7204-341-2

**Anotace:**

The service robotics mechanisms with manipulation body make possible the use in home environment, in health care (for example hospitals, medical institutions for long-term cases, home boarding-houses, sanatoria, etc.) and for other service loads. From this point of view a basic division of this manipulation bodies is carried out and possibilities of basic practical applications are shown. These mechanisms practice the manipulation with objects of common shapes, in case of need their transport too. The exploitation find applications from simple joint arms till up the autonomous service robots. A more detailed attention is paid to the design of manipulation body construction in our department. With the gripper change in the end arm we can attain its universal use for different kinds of service tasks.

NOVÁK, P., MOSTÝN, V., KRÁLÍČEK, L. Control of omnidirectional mobile robot. In: Proceedings of 5th International Carpathian control conference ICC 2004, Zakopane 25.-28.5.2004, Poland, Krakow: FMER AGH-UCT Krakow, 2004, s. 757-762; ISBN 83-89772-00-0

**Anotace:**

This paper covers the construction and control of omni directional mobile robot on omni directional Roller Wheels. This robot was developed at the Department of Robotics and it derived from robot MVR23. The robot is calculated for education and research purposes. Main topic of research is implementation of AI based on neural nets.

KÁRNÍK, L. – MOSTÝN, V. – NOVÁK, P. The service robotics mechanism with manipulation body. In RAAD'2004, Brno, Faculty of Mechanical Engineering, Institute of Production Machines, 2004, pp. 268-271. ISBN 80-7204-341-2.

**Anotace:**

The service robotics mechanisms with manipulation body make possible the use in home environment, in health care (for example hospitals, medical institutions for long-term cases, home boarding-houses, sanatoria, etc.) and for other service loads. From this point of view a basic division of this manipulation bodies is carried out and possibilities of basic practical applications are shown. These mechanisms practice the manipulation with objects of common shapes, in case of need their transport too. The exploitation find applications from simple joint arms till up the autonomous service robots. A more detailed attention is paid to the design of manipulation body construction in our department. With the gripper change in the end arm we can attain its universal use for different kinds of service tasks.

KÁRNÍK, L. – TURONĚ, M. Use the manipulation body with artificial muscles in service robots. In: Proceedings of International Conference Robtep 2004 Vyšné Ružbachy, Slovak Republic, 19. - 21. 5. 2004, pp. 270-275. ISBN 80-8073-134-9.

**Anotace:**

Manipulation bodies in service robotics have wide spectrum of apply in no engineering regions. Some constructions of manipulation bodies for service robots employ to drive artificial muscles. Artificial muscle presents new trend in application drives based on combination elastic supple material and electronic elements. His construction resembles a human muscle. It finds exercise everywhere, where from different reasons it is impossible use common type drive. Manipulation body with artificial muscles can be with advantage employ in health service, for service workplace, in town environment etc. Like a concrete example can be shown a designed manipulation body with artificial muscles of firm FESTO.

KÁRNÍK, L. – SKAŘUPA, J. – MOSTÝN, V. Service robots for manipulation task in urban environment. In: Proceedings of International Conference Robtep 2004 Vyšné Ružbachy, Slovak Republic, 19. - 21. 5. 2004, pp. 264-269. ISBN 80-8073-134-9.

**Anotace:**

Service robots exploited for manipulation tasks they have in nowadays versatile spectrum use in world. There is concerned especially about non engineering areas. Exploitation they have different of type manipulation body with combination various type of chassis. The robots they can move at indoor and outdoor environment. The characteristic environment for practice manipulation tasks it is urban environment.