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ESTABLISHING THE MOTION FUNCTIONS FOR AN ASSISTIVE ROBOT FOR PEOPLE WITH MOTOR DISABILITIES

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Abstract: *Nowadays, robots and robotic mechanisms are also a great technological challenge and as a result they can be found in all fields of activity, such as service, management, industrial, agricultural and medical. In the medical field, in addition to robots assisting doctors in various operations, there are also robots assisting patients with various traumas and strokes to regain their mobility, so the involvement and demand for robots in the medical field is growing. The assistive robot presented in this paper has the potential to provide support for a wide range of tasks related to physical assistance, therapies and rehabilitation.*

Key words: *motion functions, assistive robot, assistant robot, locomotor disabilities, motor disabilities, robot therapies, medical robots.*

1. INTRODUCTION

Regarding medical robots used in the care and rehabilitation of people with different disabilities, they can be classified into:

- robots designed for functional readjustment (disability correction) - when accidents or even illness impair the body's abilities, practically replace kinesiotherapy or to remedy organic deficiencies by means of exoskeletons (in the case of amputated limbs or tetraplegia), the robot replacing those defective or missing body parts;
- robots designed for social rehabilitation - these are used to provide both physical and social support to disabled or elderly people. This category includes robots capable of supervising or replacing human help or when it is rejected for pathological reasons.

The development of medical robots stands out in our century as an exceptional field and perspective, so a lot of research centers have developed various mechanical systems for rehabilitation or assistance, thus putting the foundations of a new direction in research with positive results that have been an encouragement for the development of new medical systems and robots.[1]-[5]

The structure proposed for further study and development is a hybrid model, shown in figure 1, consisting of a mobile platform on which a 2T serial structure is mounted.

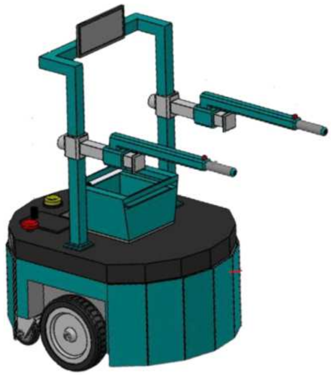

Fig. 1. The design of the robot intended for people with motor disabilities

2. ASSISTANT ROBOT DESIGN

The proposed structure to be developed, presented in figure 1, with the abbreviation ARPMD (Assistive Robot for People with motor Disabilities) is intended to be used to assist people with motor disabilities, but also to perform rehabilitation therapies based on robot movements in order to achieve the motor rehabilitation performance of the users.

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As shown in figure 2, the robotic system is based on a mobile structure, marked with (1), on which is fixed the frame with two arms (2), which allow to perform a set of up-down or front-back movements, which helps the patient in movements.

Movement of the mobile structure (1) is achieved by means of four wheels, of which two wheels are driving wheels and the other two are for steering. The driving wheels are controlled by two DC motors, one for each wheel.

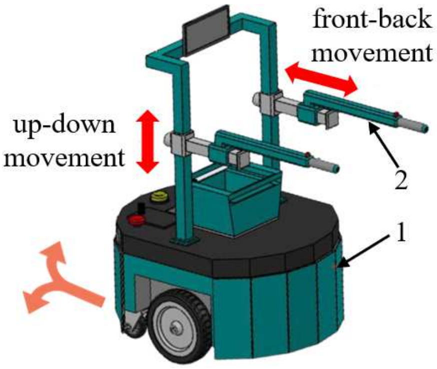


Fig. 2. The movements that the assistant robot performs

The serial structure (the arms that give control over the serial structure) are driven by four DC servomotors, as shown in figure 3, which can be adjusted according to the height of the operator, who can change the speed and direction of travel of the robot at any time.

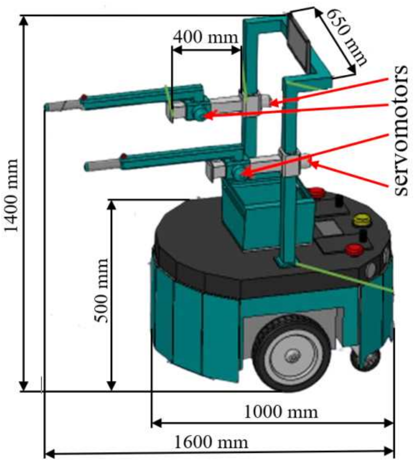
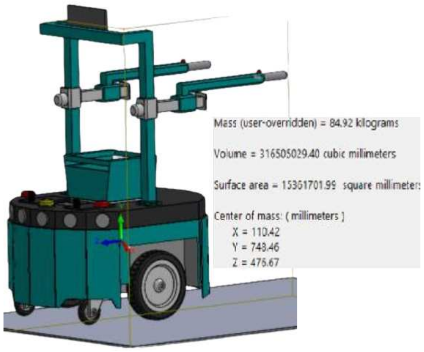


Fig. 3. General dimensions of the robotic structure

Given the average human body size, 1,70 m, the prototype has the following general dimensions: 1600x820x1400. After modeling the cad and applying the material qualities of the components, information was extracted and analyzed using the "mass properties" function in SolidWorks, which resulted in the mobile structure of the robotic system weigh 85 kg and the weight of the sub-assembly of the serial structure is 10 kg, totaling 95 kg. Also, as shown in figure 4, the relative center of mass to the system reference of the robot is at: X = 110 mm, Y = 748 mm, Z= 476 mm.



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Mass (user-overridden) = 84.92 kilograms

Volume = 316505029.40 cubic millimeters

Surface area = 15361701.99  square millimeters

Center of mass: ( millimeters )
     X = 110.42
     Y = 748.46
     Z = 476.67
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Fig. 4. Relative center of mass of the robot

3. MODELLING OF THE MOBILE STRUCTURE - KINEMATIC AND DYNAMIC

3.1 Equations of geometry and kinematics of the moving structure

Considering that the rehabilitation and assistance robot is a mobile platform, its general motion is subject to plane-parallel motion, as shown in figure 5. [6],[7]

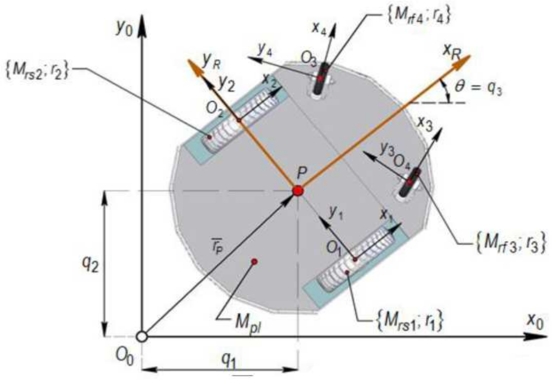

Fig. 5. The scheme for plane-parallel motion

The displacement of the moving structure relative to the fixed reference system (O), can be expressed by three independent parameters, according to expression:

$$ {}^{0}\overline{X}_{(3\times 1)} = \left[\begin{array}{c} x_p(t) = q_1(t) \\ y_p(t) = q_2(t) \\ \hline q(t) = q_3(t) \end{array}\right] \qquad (1)$$

The column vector of operational velocities expressing the absolute motion of the mobile robot is: [3]

$$ {}^{0}\dot{X} = [\dot{q}_1 \quad \dot{q}_2 \quad \dot{q}_3]^T \qquad (2)$$

The mobility of the robot is ensured by two driving wheels M_{rs1}, M_{rs2} having their center's at points O_1, O_2 which execute rotational movements around the Y axis of the robot system, as well as two other free (steering) wheels M_{rf1}, M_{rf2} having their center's at points O_3, O_4 which in addition to the rotational movement around the Y axis also exert a rotation along the Z axis of the robot system, as shown in figure 6.

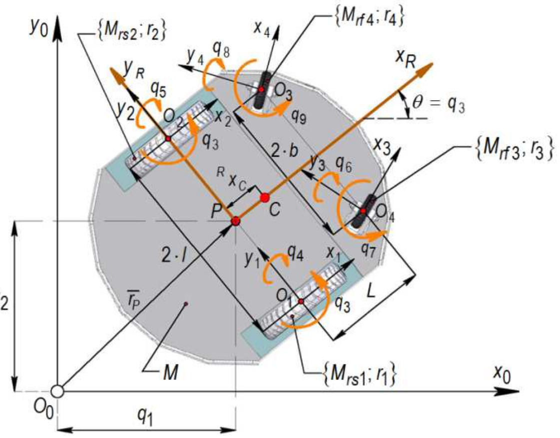

Fig. 6. Independent parameters

The sliding constraint of the robotic platform along the Oy-axis is expressed by the relation:

$$\dot{y}_R = -\dot{q}_1 \cdot \sin q_3 + \dot{q}_2 \cdot \cos q_3 = 0 \qquad (3)$$

For the structure to perform a linear displacement (translational motion) without sliding, then:

$$\begin{aligned} \dot{x}_R &= \dot{q}_1 \cdot \cos q_3 + \dot{q}_2 \cdot \sin q_3 \\ &= \frac{r}{2} \cdot (\dot{q}_4 + \dot{q}_5) \\ q_{ji}(\tau_{i-1}) &= q_{ji-1;} \\ q_{ji}(\tau_i) &= q_{ji}; \end{aligned} \qquad (4)$$

From the expression (4), it follows that:

$$\dot{q}_4 = \dot{q}_5 + \frac{2\cdot l}{r} \cdot \dot{q}_{3;} \dot{q}_5 = \dot{q}_4 - \frac{2\cdot l}{r} \cdot \dot{q}_{3;} \qquad (5)$$

Thus, substituting q_4 and q_5 from relation (5) into the equation gives the expressions below:

$$\begin{aligned} &\dot{q}_1 \cdot \cos q_3 + \dot{q}_2 \cdot \sin q_3 - \dot{q}_4 \cdot r + \dot{q}_3 \cdot l \\ &\quad = 0 \\ &\dot{q}_1 \cdot \cos q_3 + \dot{q}_2 \cdot \sin q_3 - \dot{q}_5 \cdot r + \dot{q}_3 \cdot l \\ &\quad = 0 \end{aligned} \qquad (6)$$

The above expressions represent the conditions necessary for the driving wheels to perform pure, slip-free rotations.

The sliding of the freewheels along the axis O_{y3}, O_{y4} is prevented by:

$$\begin{aligned} &(\dot{q}_1 - L \cdot \dot{q}_3 \cdot \sin q_3 + b \cdot \dot{q}_3 \cdot \cos q_3) \\ &\quad \cdot \sin(q_3 + q_7) + \\ &+(\dot{q}_2 + L \cdot \dot{q}_3 \cdot \cos q_3 + b \cdot \dot{q}_3 \cdot \sin q_3) \\ &\quad \cdot \cos(q_3 + q_7) = 0 \\ &(\dot{q}_1 - L \cdot \dot{q}_3 \cdot \sin q_3 + b \cdot \dot{q}_3 \cdot \cos q_3) \\ &\quad \cdot \sin(q_3 + q_9) + \\ &+(\dot{q}_2 + L \cdot \dot{q}_3 \cdot \cos q_3 + b \cdot \dot{q}_3 \cdot \sin q_3) \\ &\quad \cdot \cos(q_3 + q_9) = 0 \end{aligned} \qquad (7)$$

Non-slip rolling of freewheels is achieved if the following conditions are satisfied:

$$\begin{aligned} &(\dot{q}_1 - L \cdot \dot{q}_3 \cdot \sin q_3 + b \cdot \dot{q}_3 \cdot \cos q_3) \\ &\quad \cdot \cos(q_3 + q_7) + \\ &+(\dot{q}_2 + L \cdot \dot{q}_3 \cdot \cos q_3 + b \cdot \dot{q}_3 \cdot \sin q_3) \\ &\quad \cdot \sin(q_3 + q_7) = \\ &= r_{rf} \cdot \dot{q}_6 \\ &(\dot{q}_1 - L \cdot \dot{q}_3 \cdot \sin q_3 + b \cdot \dot{q}_3 \cdot \cos q_3) \\ &\quad \cdot \cos(q_3 + q_9) + \\ &+(\dot{q}_2 + L \cdot \dot{q}_3 \cdot \cos q_3 + b \cdot \dot{q}_3 \cdot \sin q_3) \\ &\quad \cdot \sin(q_3 + q_9) = \\ &= r_{rf} \cdot \dot{q}_8 \end{aligned} \qquad (8)$$

Applying a series of transformations on the expressions contained in (6), (7), (8), the differential kinematic constraints of the presented structure are expressed in the expressions (9)-(15):

$$-\sin q_3 \cdot dq_1 + \cos q_3 \cdot dq_2 + \sum_{i=3}^{9} 0 \cdot dq_i = 0 \qquad (9)$$

$$\cos q_3 \cdot dq_1 + \sin q_3 \cdot dq_2 + l \cdot dq_3 - r_{rs} \cdot dq_4 + \\ + \sum_{i=5}^{9} 0 \cdot dq_i = 0 \qquad (10)$$

$$\cos q_3 \cdot dq_1 + \sin q_3 \cdot dq_2 - l \cdot dq_3 + 0 \cdot dq_4 - \\ - r_{rs} \cdot dq_5 + \sum_{i=6}^{9} 0 \cdot dq_i = 0 \qquad (11)$$

$$- \sin(q_3 + q_7) \cdot dq_1 + \cos(q_3 + q_7) \cdot dq_2 + \\ + (L \cdot \cos q_7 - b \cdot \sin q_7) \cdot dq_3 + \sum_{i=4}^{9} 0 \cdot dq_i = 0 \qquad (12)$$

$$- \sin(q_3 + q_9) \cdot dq_1 + \cos(q_3 + q_9) \cdot dq_2 + \\ + (L \cdot \cos q_9 - b \cdot \sin q_9) \cdot dq_3 + \sum_{i=4}^{9} 0 \cdot dq_i = 0 \qquad (13)$$

$$\cos(q_3 + q_7) \cdot dq_1 + \sin(q_3 + q_7) \cdot dq_2 + \\ + (L \cdot \sin q_7 - b \cdot \cos q_7) \cdot dq_3 + \sum_{i=4}^{5} 0 \cdot dq_i - \\ - r_{rf} \cdot dq_6 + \sum_{i=7}^{9} 0 \cdot dq_i = 0 \qquad (14)$$

$$\cos(q_3 + q_9) \cdot dq_1 + \sin(q_3 + q_9) \cdot dq_2 + \\ + (L \cdot \sin q_9 - b \cdot \cos q_9) \cdot dq_3 + \sum_{i=4}^{5} 0 \cdot dq_i - \\ - r_{rf} \cdot dq_8 + \sum_{i=7}^{9} 0 \cdot dq_i = 0 \qquad (15)$$

Thus expression (9) represents the condition preventing translation along the Y_R-axis of the platform, equations (10) and (11) impose pure rolling without sliding of the driving wheels, expression (12) and (13) restrict sliding along the y3-axes and y4-axes of the driving wheels respectively, and expressions (14) and (15) also impose rolling without sliding of the turning wheels.

3.2 Direct kinematic model in Cartesian coordinates

For writing the kinematic equations of motion, each wheel is analyzed according to figure 5.

Assuming known angular velocities of the two driving wheels, in the study of the direct kinematic model, the unknowns are the linear and angular velocity of the moving structure relative to the fixed reference system:

$${}^{0}\dot{X} = \begin{bmatrix} \dot{x}_p & \dot{y}_p & \dot{\theta} \end{bmatrix}^T \\ = [\dot{x}_p \quad \dot{y}_p \quad \omega]^T \qquad (16)$$

Following some transformations, [6], the kinematic parameters of the points *O_i*, *i=1÷4*, representing the centers of the wheels of the mobile system *R*, projected onto the axes of the fixed reference system *O* are expressed as :

$$\bar{v}_{O_1} = \begin{bmatrix} \dot{q}_1 + l \cdot \dot{q}_3 \cdot cos\, q_3 \\ \dot{q}_2 + l \cdot \dot{q}_3 \cdot sin\, q_3 \\ 0 \end{bmatrix}; \omega_1 = \begin{bmatrix} 0 \\ \dot{q}_4 \\ \dot{q}_3 \end{bmatrix} \qquad (17)$$

$$\dot{\bar{v}}_{O1} \\ = \begin{bmatrix} \ddot{q}_1 + l \cdot \ddot{q}_3 \cdot cos\, q_3 - l \cdot \dot{q}_3{}^2 \cdot sin\, q_3 \\ \ddot{q}_2 + l \cdot \ddot{q}_3 \cdot sin\, q_3 - l \cdot \dot{q}_3{}^2 \cdot cos\, q_3 \\ 0 \end{bmatrix}; \dot{\omega} \\ = \begin{bmatrix} 0 \\ \ddot{q}_4 \\ \ddot{q}_3 \end{bmatrix} \qquad (18)$$

$$\bar{v}_{O_2} = \begin{bmatrix} \dot{q}_1 - l \cdot \dot{q}_3 \cdot cos\, q_3 \\ \dot{q}_2 - l \cdot \dot{q}_3 \cdot sin\, q_3 \\ 0 \end{bmatrix}; \omega_2 = \begin{bmatrix} 0 \\ \dot{q}_5 \\ \dot{q}_3 \end{bmatrix} \qquad (19)$$

$$\dot{\bar{v}}_{O_2} \\ = \begin{bmatrix} \ddot{q}_1 - l \cdot \ddot{q}_3 \cdot cos\, q_3 + l \cdot \dot{q}_3{}^2 \cdot sin\, q_3 \\ \ddot{q}_2 - l \cdot \ddot{q}_3 \cdot sin\, q_3 - l \cdot \dot{q}_3{}^2 \cdot cos\, q_3 \\ 0 \end{bmatrix}; \dot{\omega} \\ = \begin{bmatrix} 0 \\ \ddot{q}_5 \\ \ddot{q}_3 \end{bmatrix} \qquad (20)$$

$$\bar{v}_{O_3} \\ = \begin{bmatrix} \dot{q}_1 - L \cdot \dot{q}_3 \cdot sin\, q_3 + b \cdot \dot{q}_3 \cdot cos\, q_3 \\ \dot{q}_2 + L \cdot \dot{q}_3 \cdot cos\, q_3 + b \cdot \dot{q}_3 \cdot sin\, q_3 \\ 0 \end{bmatrix}; \omega \\ = \begin{bmatrix} 0 \\ \dot{q}_6 \\ \dot{q}_7 \end{bmatrix} \qquad (21)$$

$$\dot{\bar{V}}_{O3}=\begin{bmatrix}\begin{pmatrix}\ddot{q}_1-L\cdot(\ddot{q}_3\cdot\sin q_3+\dot{q}_3{}^2\cdot\cos q_3)+\\+b\cdot(\ddot{q}_3\cdot\cos q_3-\dot{q}_3{}^2\cdot\sin q_3)\end{pmatrix}\\\begin{pmatrix}\ddot{q}_2+L\cdot(\ddot{q}_3\cdot\cos q_3-\dot{q}_3{}^2\cdot\sin q_3)+\\+b\cdot(\ddot{q}_3\cdot\sin q_3+\dot{q}_3{}^2\cdot\cos q_3)\end{pmatrix}\\0\end{bmatrix};\dot{\omega}_3=\begin{bmatrix}0\\\ddot{q}_6\\\ddot{q}_7\end{bmatrix}\quad(22)$$

$$\bar{v}_{O_4}=\begin{bmatrix}\dot{q}_1-L\cdot\dot{q}_3\cdot sin\,q_3-b\cdot\dot{q}_3\cdot cos\,q_3\\\dot{q}_2+L\cdot\dot{q}_3\cdot cos\,q_3-b\cdot\dot{q}_3\cdot sin\,q_3\\0\end{bmatrix};\omega=\begin{bmatrix}0\\\dot{q}_8\\\dot{q}_9\end{bmatrix}\quad(10)$$

$$\dot{\bar{V}}_{O4}=\begin{bmatrix}\begin{pmatrix}\ddot{q}_1-L\cdot(\ddot{q}_3\cdot\sin q_3+\dot{q}_3{}^2\cdot\cos q_3)-\\-b\cdot(\ddot{q}_3\cdot\cos q_3-\dot{q}_3{}^2\cdot\sin q_3)\end{pmatrix}\\\begin{pmatrix}\ddot{q}_2+L\cdot(\ddot{q}_3\cdot\cos q_3-\dot{q}_3{}^2\cdot\sin q_3)-\\-b\cdot(\ddot{q}_3\cdot\sin q_3+\dot{q}_3{}^2\cdot\cos q_3)\end{pmatrix}\\0\end{bmatrix};\dot{\omega}_4=\begin{bmatrix}0\\\ddot{q}_8\\\ddot{q}_9\end{bmatrix}\quad(23)$$

The previously obtained expressions characterize the direct kinematic model in Cartesian coordinates and which after applying matrix transformations will play an important role in determining the direct dynamics equations for the moving platform.

Based on the above considerations, [8], write the following relation in matrix form:

$$\dot{X}=\begin{bmatrix}\dot{q}_1\\\dot{q}_2\\\omega=\dot{q}_3\end{bmatrix}=\begin{bmatrix}cq_3&0\\sq_3&0\\0&1\end{bmatrix}\cdot\begin{bmatrix}\frac{r}{2}\cdot(\dot{q}_4+\dot{q}_5)\\\frac{r}{2\cdot l}\cdot(\dot{q}_4-\dot{q}_5)\end{bmatrix}\quad(24)$$

which expresses the velocity of the robot relative to the fixed reference system $\{O\}$.

3.3 Determination of dynamic control functions for the moving structure

In order for the robot to execute the rectilinear translation motion, according to its constructive structure, see also figure 6, the essential condition is that the driving moments of the driving wheels must be equal, i.e [9]:

$$Q_m^4=Q_m^5\quad(25)$$

from which the following equivalences are deduced:

$$(\ddot{q}_4=\ddot{q}_5),q_3=cst.,(\dot{q}_3,\ddot{q}_3)=0,(\ddot{q}_6=\ddot{q}_8),(q_7,q_9)=0\quad(26)$$

Following some transformations, [6], the expressions of the driving moments related to translation are:

$$Q_m^4=Q_m^5=\frac{r_{rs}}{2}\cdot[M\cdot(\ddot{q}_1\cdot cos\,q_3+\ddot{q}_2\cdot sin\,q_3)+\\+\varepsilon\cdot(M_{rf}\cdot r_{rf}+M_{rs}\cdot r_{rs})+\mu\cdot M\cdot g]\quad(27)$$

For the mobile platform to perform a rotation, we must write the expression (16):

$$(\dot{q}_1,\dot{q}_2)=0,(\ddot{q}_1,\ddot{q}_2)=0\quad(28)$$

Due to the mechanical constitution, according to the figure 6, another essential condition for achieving the orientation of the structure is:

$$Q_m^4=-Q_m^5,\quad(29)$$

which leads to,

$$(\ddot{q}_5=-\ddot{q}_4),(\ddot{q}_6=\ddot{q}_8)\quad(30)$$

Considering certain differential kinematic constraints of the mobile robot and following some transformations [6], it follows :

$$\ddot{q}_6=\frac{\sqrt{L^2+b^2}}{r_{rf}}\cdot\ddot{q}_3;\ddot{q}_4=\frac{l}{r_{rs}}\cdot\ddot{q}_3\quad(31)$$

So, according to [6], the expressions for the driving moments of the two driving wheels of the mobile robot in the case of orientation are as follows:

$$Q_m^4=-Q_m^5=[\frac{I_{\Delta P}+2\cdot M_{rf}\cdot(b^2+L^2)}{2\cdot l}+\\+M_{rf}\cdot\frac{L^2+b^2}{2\cdot l}+M_{rs}\cdot\frac{l}{2}]\cdot r_{rs}\cdot\ddot{q}_3+\\+\frac{\mu\cdot M\cdot g\cdot r_{rs}}{2\cdot[\mu\cdot(r_{rf}-r_{rs})+L]}\cdot\\\cdot\left[({}^{R}x_C-\mu\cdot r_{rs})\cdot\frac{\sqrt{L^2+b^2}}{l}+(L-{}^{R}x_C+\mu\cdot r_{rf})\right]\quad(32)$$

Expression (32) is the one that represents the drive moments for the two driving wheels of the robotic system.

4. CONCLUSION

Starting from the idea of designing a structure with a role in the medical assistance of people with mobility impairments, a hybrid robot structure was briefly presented, consisting of two mechanical structures: a mobile robot and a serial structure.

For the mobile structure, velocities and accelerations were determined, after which the expressions of the driving moments of the two driving wheels were determined. Their determination was performed considering the conditions necessary to achieve a translation or orientation of the robot, as well as kinematic constraints.

At the stage of dynamic control functions of any type, based on the movement of the structure along a well-determined path with the aim of reaching points, speeds and accelerations imposed by the work process, the motors of the drive system must overcome generalized external and gravitational forces, which are usually well determined, as well as generalized inertial forces due to motors, mechanical transmissions or the resistance structure of the mechanical system. The analysis of the displacement of the moving structure to reach the target point was based on the assumption that the positioning and orientation of the robot are not performed simultaneously, so the two motions were determined independently.

8. REFERENCES

[1]https://www.semanticscholar.org/paper/Personal-Adaptive-Mobility-Aid-for-the-Infirm-and-Lacey-MacNamara/f418a73ee26505a95ff56dfce00b3dc665ad31a9.

[2] Shi F, Cao Q, Leng C, Tan H: *Based On Force Sensing- Controlled Human-Machine Interaction System For Walking Assistant Robo*t. Proceedings of the 8th World Congress on Intelligent Control and Automation 2010, Jinan, China, 6528-6533.

[3] https://stepsbudapest.com/wp-content/uploads/Lokomat-Datasheet.pdf, last accessed 2020/09/01.

[4] https://stepsbudapest.com/wp-content/uploads/Lokomat-Datasheet.pdf

[5] https://stepsbudapest.com/lokomat-pro-3d/, last accessed 2020/09/01.

[6] Schonstein, C., *Contribuții în dezvoltarea unei structuri robotizate hibride, PhD Thesis,* Cluj-Napoca, 2011.

[7] Kalman,K., *„Contribuţii privind modelarea şi simularea roboţilor mobili şi roboţilor cu structură serială", PhD Thesis,* Cluj-Napoca, 2011.

[8] Negrean, I., *Mecanică Avansată în Robotică*, Ed. UT PRESS, ISBN 978-973-662-420-9. Cluj-Napoca, 2008.

[9] Negrean, I., Schonstein, C., Szoke, Z., *Contributions to the Dynamics of Mobile robot PatrolBot,* Acta Technica Napocensis, Series: Applied Mathematics and Mechanics, Vol. 54, Issue IV, 2011, ISSN 1221-5872, Romania.

STABILIREA FUNCȚIILOR DE MIȘCARE PENTRU UN ROBOT ASISTENT DESTINAT PERSOANELOR CU DIZABILITĂȚI MOTORII

Rezumat: *În zilele noastre, roboții și mecanismele robotizate reprezintă de asemenea o mare provocare tehnologică și ca urmare ele se regăsesc în toate domeniile de activitate, cum ar fi cele pentru servicii, management, industrie, agricultură și medicină. În domeniul medical, pe lângă roboții care îi ajută pe medici în diverse operații, există și roboți care ajută pacienții cu diverse traumatisme și accidente vasculare cerebrale să își recupereze mobilitatea, astfel că implicarea și cererea de roboți în domeniul medical este în creștere. Robotul asistent prezentat în această lucrare are potențialul de a oferi sprijin pentru o gamă largă de sarcini legate de asistență fizică, terapii și reabilitare.*

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