



Figure 1. Sensitivity analysis of the designed CAMP IVD device by using a microfluidic chip with dendritic channels/ reaction wells for pet care managements.

inexpensive and easy-to-operate devices in on-site and point of care bioanalysis, particularly in rabies virus detection.

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References: 1. Campbell, J. B. & Charlton, K.M. (1988). *Developments in Veterinary Virology: Rabies*. Springer.
2. Rui Mao, Lifei Qi, Jianjun Li, Ming Sun, Zhuo Wang and Yuguang Du “Competitive annealing mediated isothermal amplification of nucleic acids” *Analyst*, 2018; 143: 639–642.

024 | The research about servo control of 6-DOF workbench based on vacuum environment

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Objectives: In the vacuum environment, the multi-dimensional worktable will have some problems such as uneven lubrication, long-term emission of grease, motion stuck and so on. Traditional servo control schemes are mostly designed based on ground system, and there will be matching offset in the application of this control in vacuum. Based on the servo control research of a six-degree-of-freedom worktable, this paper improves its servo system to achieve the smoothness of the worktable in vacuum environment.

Methods: The control scheme of multi-dimensional console for ground equipment is improved. The working characteristics of the worktable are explored based on the test data of vacuum tank. The influence factors of vacuum environment on the movement of the console are summarized. The problem is eliminated or improved by means of servo improvement scheme. This method of adding creep servo control can effectively realize the problem reproduction of worktable in vacuum environment.

Results: Using the improved creep servo control method to control the motion servo of the 6-DOF worktable in vacuum environment can solve the problem of uneven lubrication of the worktable under environmental impact. In the aspect of linear motion accuracy, compared with the servo control technology without this scheme, the accuracy of this scheme can be improved by 100%.

Conclusions: Servo control technology of multi-degree-of-freedom worktable in vacuum environment adopts servo control schemes such as creeping to effectively solve the unfavorable vacuum environment. This technical scheme can be applied to linear motion system in vacuum environment, especially for multi-degree-of-freedom motion. The technology can be applied to servo control systems of various moving structures in vacuum environment.

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Keywords: Vacuum environment, Servo control, Workbench, Six degrees of freedom.

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025 | Based on the skill master studio, the teacher's “three-in-one” professional ability improvement research

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Objectives: The research results provide a strategy and way to improve the ability of teachers in vocational colleges, that is, relying on the skill master studio, teachers “three-in-one” countermeasure research program.

Methods: Skills are taught to enhance teachers’ professional skills. The school’s productive training base introduces the vehicle maintenance business of cooperative enterprises, imports the real work tasks of the enterprise, the studio head and technical experts pass on the skills, leads the teachers to carry out vehicle technical maintenance, and enhances the teacher’s practical skills. At the same time, young teachers to cooperative enterprises to exercise, follow the post internship, through some process to enhance the skill level of teachers. Participate in various teaching competitions to enhance teaching ability. Through the teaching contest, skills contest and other platforms to enhance the teaching and research ability of teachers. At the same time, the use of the studio’s policy resources, for the government and government functions to provide training, by teachers to undertake training tasks, greatly enhance the teaching ability of teachers; In the process of technology accumulation and innovation, teachers’ scientific research ability is enhanced. Take the