



西安交通大学
XI'AN JIAOTONG UNIVERSITY



仿生器官——人工前庭

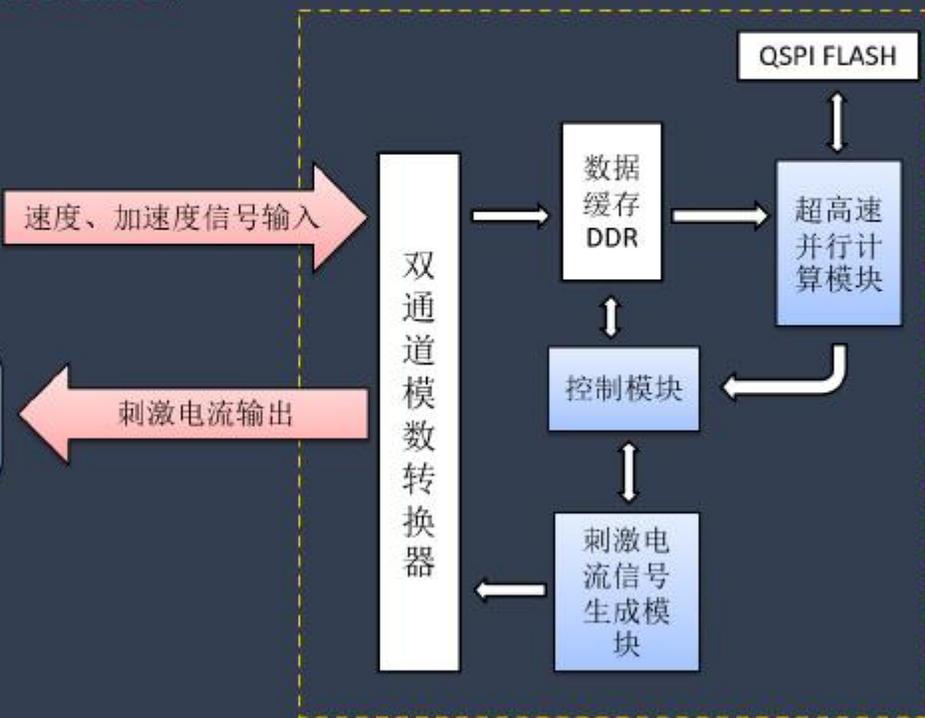
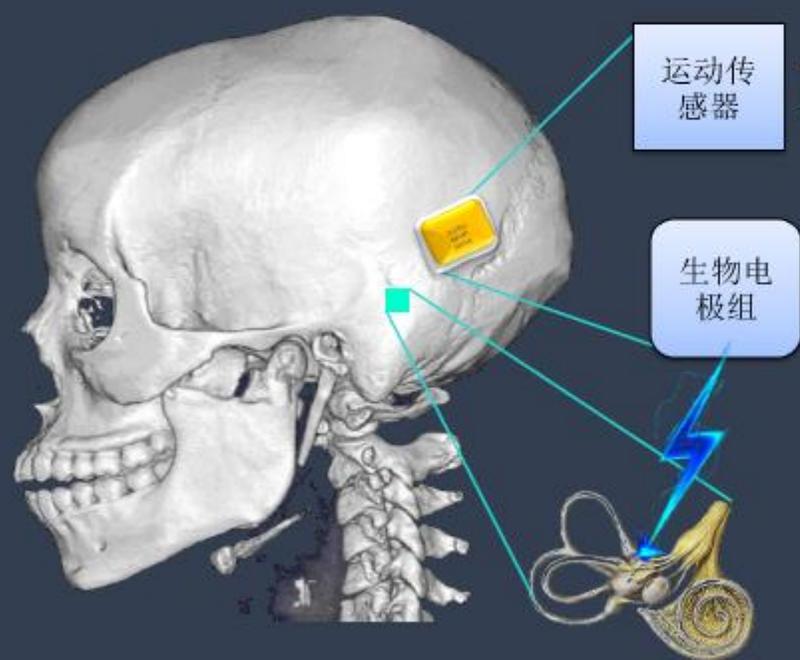
用于空间感知及姿态平衡的智能修复

西安交通大学

任鹏宇·第六感科技创新团队

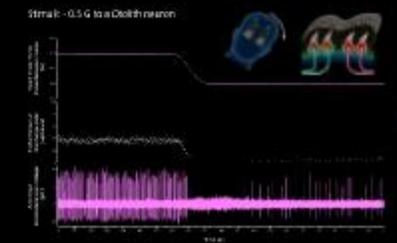
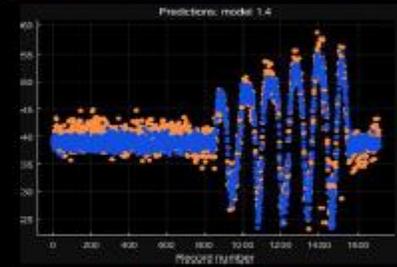
仿生器官——人工前庭

一种可将头部运动信息转化为前庭神经信号的智能神经接口 (Neural Interface)



我们研发的人工前庭

技术创新



优化的电路设计
简洁电路, 元件升级

仿生的神经调控策略
真实神经信号, 高维拟合

精准的神经群体调控
权重信息理论, 优化调控

增添耳石器调控策略
记录神经信号, 构建调控策略

关键技术一
电极开发设计
植入手术技巧

关键技术二
神经信号记录
神经信息解码

知识产权布局到位，学术成果硕果累累

团队目前获批国家发明专利1项，实用新型1项，3项发明专利处于实审阶段，团队成员以一作或通讯发表SCI论文9篇。



实用新型专利证书

专利号: 450228

IPC分类号: H01M 10/42

发明名称: 一种锂离子电池自修复材料及其制备方法

申请人: 西安交通大学

发明人: 任继华

授权公告日: 2021年11月23日

摘要: 本发明公开了一种锂离子电池自修复材料及其制备方法，所述材料由... (text partially obscured)

局长 申长雨

2021年11月23日

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Life Sciences

Open Access Article

The real identity and sensory overlap mechanisms of special vestibular afferent neurons that sense both rotation and linear force

Pengxi Bao^{1,2}, Bowen Li¹, Shiyu Dong¹, Bingting Liu¹, Anqiang Qi¹, Shuping Gong¹, Qing Zhang¹, Peng Han^{1*}

ABSTRACT

While although the vestibular system has been widely investigated only for past 70 years, there is still an ongoing controversy about special vestibular afferent (SVA) neurons regarding to their receptor and linear force sense based through neurophysiological techniques. However, the sensory overlap mechanism of SVA neurons is still unclear, which may be closely related to vestibular-related diseases.

1. Introduction

The vestibular system is termed the "sixth sense", playing a vital role in animal survival by contributing to visual stabilization [1], head and neck posture maintenance [2], spatial orientation perception [3] and navigation [4]. In contrast to low-frequency vestibular signals input, high-frequency signals are not characterized by simple, linear, sustained, and linear in gain modulation, and highly responsive [5, 6].

However, a recent study showed that vestibular afferent neurons have a complex structure and function, according to sensory signals of rotation and linear force [7]. Furthermore, the study of vestibular afferent neurons is essential for the development of vestibular-related diseases [8]. Vestibular afferent (VA) neurons are the first-order neurons in the vestibular system, which transmit information to higher-order neurons in the brain [9, 10]. It is generally accepted that vestibular afferent neurons (VA) neurons conveying an unimodal signal are related to rotation, while vestibular afferent (VA) neurons conveying an omnimodal signal receive linear force. Because some previous studies focusing on animal labeling and single-unit recording revealed that there were no VA neurons that responded to both rotation and linear force unimodally [9, 10].

However, a recent study showed that vestibular afferent neurons have a complex structure and function, according to sensory signals of rotation and linear force [7]. Furthermore, the study of vestibular afferent neurons is essential for the development of vestibular-related diseases [8]. Vestibular afferent (VA) neurons are the first-order neurons in the vestibular system, which transmit information to higher-order neurons in the brain [9, 10]. It is generally accepted that vestibular afferent neurons (VA) neurons conveying an unimodal signal are related to rotation, while vestibular afferent (VA) neurons conveying an omnimodal signal receive linear force. Because some previous studies focusing on animal labeling and single-unit recording revealed that there were no VA neurons that responded to both rotation and linear force unimodally [9, 10].

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neurons

Background: The vestibular system has been widely investigated only for past 70 years, there is still an ongoing controversy about special vestibular afferent (SVA) neurons regarding to their receptor and linear force sense based through neurophysiological techniques. However, the sensory overlap mechanism of SVA neurons is still unclear, which may be closely related to vestibular-related diseases.

Conclusion: The study of vestibular afferent neurons is essential for the development of vestibular-related diseases. Vestibular afferent (VA) neurons are the first-order neurons in the vestibular system, which transmit information to higher-order neurons in the brain.

人工前庭的市场应用

医疗健康



前庭疾病治疗的最后一道保障

航空航天



空间适应综合征，失重认知障碍等

智能制造



智能机器人仿生平衡控制

人工前庭的技术成熟度

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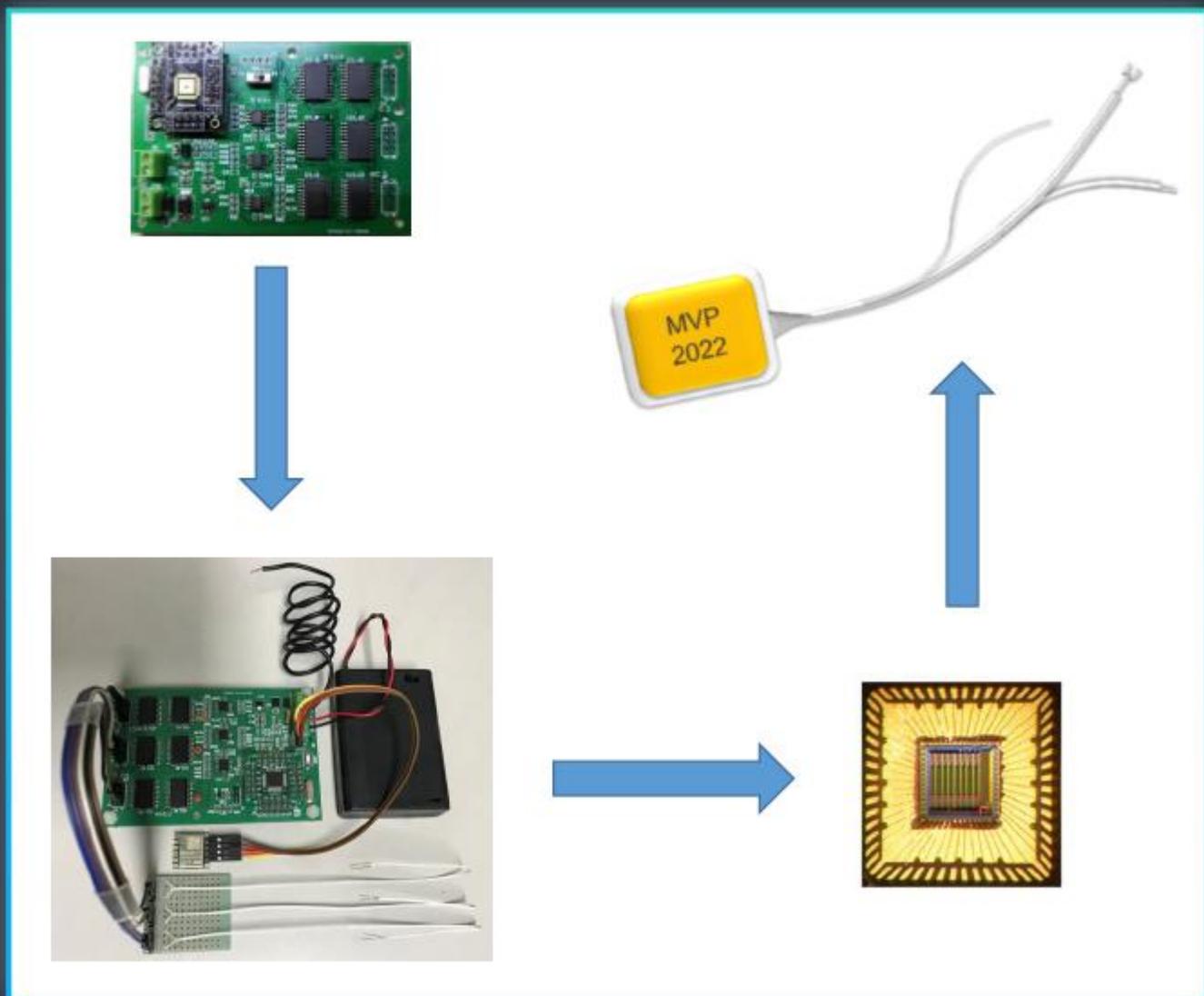
技术成熟度四级

- 技术原理已实现
- 开发出第一代原理样机
- 关键功能以实现
- 向工程化阶段推进

国内首家研发单位

目前国内独家单位

研发技术门槛极高



动物实验展示前庭功能修复效果展示

基于前庭眼反射 (VOR) 的前庭功能修复评估

