TO-167 • PT 1.2845
Institute of Neurosciences and Medicine
Medical Imaging Physics (INM-4)

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Innovative Sensor Chip for PET Detector Rings with Improved Depth-of-Interaction Detection

Technology Description

The proposed sensor chip offers a groundbreaking solution for positron emission tomography (PET) detector rings. It addresses the critical Depth-of-Interaction (DOI) problem, enhancing sensitivity and resolution while reducing parallax errors during line of response (LOR) determination. By introducing a novel encoding mechanism, this chip revolutionizes PET imaging by enabling accurate positioning and depth detection within scintillation crystals. Furthermore, it overcomes limitations posed by current sensor technologies, offering superior performance and cost-effectiveness.

Problem

Existing PET detector rings face significant challenges, including parallax errors, limited sensitivity, and resolution loss due to the DOI problem. Moreover, current sensor technologies are costly and fail to provide comprehensive depth information, hindering accurate PET imaging. Additionally, compatibility with magnetic resonance imaging (MRI) and efficient use of space remain pressing concerns.

Solution

The innovative sensor chip integrates a series of microcells, each equipped with photodiodes and current dividers for precise position assignment. Through strategic quenching mechanisms, it efficiently divides generated photocurrents, enabling accurate depth detection within scintillation crystals. By employing linear encoding across multiple sensor chips, this solution achieves unparalleled accuracy in PET imaging while minimizing space requirements and costs. Moreover, its compatibility with MRI systems ensures versatile application in medical imaging.

Potential Use

The sensor chip presents a transformative solution for PET detector rings in medical imaging applications. Its advanced depth detection capabilities enhance PET imaging accuracy, facilitating more precise diagnosis and treatment planning. Moreover, its compatibility with MRI systems expands its utility, enabling comprehensive multimodal imaging. Additionally, its cost-effectiveness and efficiency in space utilization make it an ideal choice for both research and clinical settings, driving advancements in PET technology.

Interesting for the following sectors
» Medical Imaging
» Nuclear Medicine
» Research / Academia

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Keywords
PET imaging
Depth-of-Interaction (DOI) detection
Parallax errors
Sensor chip technology
Medical imaging

More Information
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Development Status and Next Steps

The technology was validated in the lab. We are open to collaborations with and licensing to research institutions, medical facilities, and technology developers interested in further validating and implementing this innovative imaging technology. Collaborators can explore applications in specific areas and help refine and expand the capabilities of the technology.

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