

# Physics-informed Neural Networks for Robot Mapping

**Physics-informed AI delivering 10x faster real-time mapping and motion planning for robots.**

Mapping and motion planning are essential to using robotics in real-world environments. While these two facets are inherently joined, traditional methods often require linking two distinct and computationally complex approaches. To resolve this challenge and reduce the computational expense of on-the-fly mapping and motion planning, researchers at Purdue University propose the use of Neural Time Fields (NTFields), a physics informed neural framework that actively explores unknown environments while mapping the robot's arrival time field. This technology offers benefits in control of robotics such as those in automated manufacturing or autonomous driving. This technology is related to 2023-QURE-70169: Physics-informed Neural Motion Planning.

## Advantages

- Significantly reduced computation time
- Simultaneous mapping and motion planning

## Applications

- Control of robotic manipulators
- Automated manufacturing
- Autonomous driving

## Technology Validation:

This technology has been validated through simulated and real world testing. Compared to traditional approaches, NTFields were able to increase computation speed by 10x while maintaining high accuracy.

**TRL: 4**

## Technology ID

2024-QURE-70611

## Category

Robotics &  
Automation/Automation &  
Control  
Automotive & Mobility  
Tech/Mobility AI & Embedded  
Intelligence Systems  
Robotics &  
Automation/Autonomous  
Systems & Perception AI

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