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पेटेंट कार्यालय का एक प्रकाशन  
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(57) Abstract :  
 NANOMATERIAL-ENHANCED SELF-HEALING CONCRETE PAVEMENT SYSTEM FOR IMPROVED DURABILITY ABSTRACT The present invention relates to a self-healing concrete pavement system utilizing nanomaterials to enhance durability and extend the lifespan of concrete structures. The system comprises a concrete matrix embedded with nanomaterials such as carbon nanotubes and graphene, which detect and respond to microcracks. An integrated sensor network continuously monitors the pavement's structural integrity, identifying microcrack formation. Upon detection, an autonomous healing agent release mechanism, controlled by a central module, dispenses a nanomaterial-infused agent that interacts with the cracks, initiating repair. The system also includes machine learning algorithms to predict areas of high stress and optimize the healing process. This innovative approach significantly improves resistance to environmental wear, reduces the need for frequent repairs, and enhances the overall performance of concrete pavements. The method involves embedding nanomaterials, detecting microcracks, and releasing healing agents, providing an efficient, durable solution for concrete infrastructure.

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