Title: AUTOMATED CAR PARKING SYSTEM based on ARTIFICIAL INTELLIGENCE: Case for Harare Central Business District (CBD), Zimbabwe

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Abstract
This paper is on the design of an automated car parking system based on artificial intelligence (fuzzy logic) for the case of Harare Central Business District (CBD). The current problem is that the city is experiencing an acute shortage of parking space because it was initially built with a capacity of 7000 parking bays but space is now insufficient. A background research of the parking systems and the challenges faced in the city assisted the researchers in getting a starting point. Through wide research of how such systems are modelled in developed countries like Japan, Germany, China, India and managing to look into how such countries get to tackle parking space shortage problems and what they are doing to continually increase parking spaces in their cities etc. It was possible to come up with a fuzzy logic controller for a seven floored parking system which can control the whole parking procedure in an easy, efficient and reliable way. Moreover this assisted the researchers in coming up with a deeper understanding of how such systems function and come up with a cost efficient design for a developing nation like Zimbabwe. The fuzzy logic toolbox in MATLAB was used to create the controller commands and the feasibility of the designed controller was tested using Simulink. The implementation of an automated car parking is advantageous as it will improve the payment system, safety and will use the limited space effectively. It has been proposed to blend fuzzy with other conventional control techniques to come up with an adaptive control system. More fuzzy inputs can be included to perfect the fuzzy controller. Fuzzy logic control system can also be extended to other parking systems. Internet of Things (IoT) can be implemented in the Harare CBD to ensure easy, reliable and effective parking management.

Biography
Tawanda Mushiri has completed his PhD at the age of 34 years from University of Johannesburg, South Africa. He is the Senior Research Associate of University of Johannesburg, South Africa and Senior Lecturer at the University of Zimbabwe in Zimbabwe where he teaches Dynamics of machinery, Robotics and Artificial Intelligence. He has over 20 publications that have been cited over 50 times, and his publication H-index is 4 and has been serving as an editorial board member of reputed Journals. His research interests are in Robotics and Artificial Intelligence in Engineering and Medicine applications, Dynamics of Machinery and Solid Mechanics.

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