

## **Agent Navigation based on Boundary Value Problem using Iterative Methods**

### **ABSTRACT**

This paper presents the simulation of numerical solutions to the navigational problem of an agent traveling safely in its environment. The approach is based on the numeric solutions of the boundary value problem (BVP) that generate harmonic potential fields through a differential equation whose gradient represents navigation routes to the destination. Two methods, namely KSOR and KAOR, were tested to solve the BVP. KSOR and KAOR are variants of the standard SOR and AOR methods, respectively. In this work, the KSOR and KAOR methods were used to solve the BVP by applying Laplace's equation to obtain harmonic functions. The generated harmonic functions are then utilized by the searching algorithm to find a smooth navigational route for an agent to travel in its environment without colliding with any obstacles. The numerical results from the solutions of BVP demonstrate that the KAOR provides a faster execution time with fewer iterations compared to the KSOR method.