Abstract

For a connected graph G the length of the shortest path between two vertices $u, v \in V(G)$ is called distance $d(u, v)$ between them. A vertex w of a graph G is said to resolve two vertices u and v of G if $d(w, u) \neq d(w, v)$. Let $W = \{w_1, w_2, ..., w_k\}$ be an ordered set of vertices of G and let v be a vertex of G. The representation of a vertex v with respect to W is the k-tuple $(d(v, w_1), d(v, w_2), ..., d(v, w_k))$ denoted by $r(v|W)$. W is called a resolving set for G if distinct vertices of G have distinct representations with respect to W. The metric dimension of G denoted by $dim(G)$ is the minimum cardinality of a resolving set.
Graph structure can be used to study the various concepts of Navigation in space. Vertices in the graph denotes a work place and connections between the places can be denoted as edges. One classical problem is to place minimum machines (or Robots) at certain vertices to trace each and every vertex exactly once. This problem can be solved by using networks where places are interconnected and the navigating agent moves from one vertex to another in the network. The places or vertices of a network where the machines are placed (robots) are called landmarks. The minimum number of machines required to locate each and every vertex of the network is termed as metric dimension and the set of all minimum possible number of landmarks constitute metric basis.

A graph has a constant metric dimension if $dim(G)$ is finite and does not depend upon the choice of G. In this thesis, we determine the metric dimension of the graph, obtained by adding edges between the vertices of path graph. We prove that this graph has constant metric dimension and only k vertices appropriately chosen suffice to resolve all the vertices of this graph.