
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ وَسَتُرَدُّونَ إِلَى

عَالِمِ الْغَيْبِ وَالشَّهَادَةِ فَيُنَبِّئُكُمْ بِمَا كُنْتُمْ تَعْمَلُونَ﴾

[التوبة: 105]

﴿حَتَّىٰ إِذَا أَتَوْا عَلَىٰ وَادِي النَّمْلِ قَالَتْ نَمْلَةٌ يَا أَيُّهَا النَّمْلُ ادْخُلُوا

مَسَاكِنَكُمْ لَا يَحْطِمَنَّكُمْ سُلَيْمَانُ وَجُنُودُهُ وَهُمْ لَا يَشْعُرُونَ﴾

[النمل: 18]

صدق الله العظيم

Dedication

TO

My Family...

My beloved mother, father, sister and brothers

TO

My all beloved Relatives, Friends and all those who participated with me for their supports & emotions

TO

My all Teachers For their great efforts towards me, whom they help me to reach this stage

Thanks to them all.

Acknowledgement

First I believe in Allah how has awarded me with these uncounted blessings and shown us the right way to go on with this life... His enlightening words have given us the power and strength to continue...Even when we were hovering between the void of the right and wrong...I would like to express my thanks to all members of the electronic engineering department staff in Sudan University of science and technology, Collage of engineering for airing us this opportunity in this respective and great instruction.

I would like to record my gratitude for the most helpful cooperation i have been at every stage of the production and preparing for this thesis, by Dr.Ibrahim Khider Altahir ... I also would like to express my gratitude to Dr.Harwinder Singh Sohal a prof assisstant in Lala Lajpat Rai Institute of Engineering & Technology, Moga,Punjab , India .And to enginner Daniel Henrique Joppi a systems analyst at Engecorps , Santa Catarina, Brazil. Also for all they help me in my thesis. I owe them too much, for their supervision and help...

Abstract

A primary challenge of MANET is to design an effective routing algorithm than can adapt its behaviour to frequent and rapid changes nature of the network topology to have a shortest path between sources and destinations with low overhead and delay. Ant routing concept is a new scheme for routing inspired by the behavior of real ants. Real ants are able to find the shortest path to a food source by following the trail of a chemical substance called pheromone deposited by other ants. This thesis presents a novel scheme for MANET routing protocol called Intelligent Ant sense for mobile ad hoc routing protocol (INTANTSENSE). It utilizes a behaviour studies of “ants” in nature known as ant colony optimization to perform optimal routing activities. By combining the capability of reactive routing with distributed and multipath routing mechanism also uses the ring search model, Intelligent Ant Sense protocol displays a satisfactory performances; optimal path routing, fast route discovery and effective routing failure handling.

This thesis study the intelligent ant sense protocol across a personal area network with IEEE 802.15.4 WPAN. The intelligent ant sense protocol written and compiled to network simulator NS-2 to have the performance and compared with AODV protocol. Then, a performance comparison has been done under conditions of speed , mobility and number of nodes . Results show that the intelligent ant sense protocol ensure lower overhead and delay than AODV protocol with high packet delivered ratio but give low throughput and slightly high data loss.

المستخلص

من أهم التحديات التي تواجه شبكات الموبايل ذات التنظيم الذاتي هي إيجاد خوارزمية توجيه مناسبة لها القدرة علي ضبط سلوكها وذلك علي حسب طبيعة التغير المستمر والسريع في بنية هذا النوع من الشبكات لإيجاد أقصر وأسرع المسارات بين الأجهزة ال مرسله والأجهزة المستقبله مع إمكانية تقليل الضغط علي الشبكة وكذلك تقليل التأخير عند إنشاء المسارات بين هذه الاجهزة.

مفهوم مسار النمل هو نوع جديد من طرق التوجيه أخذت من دراسات علي سلوك النمل في بيئة الحقيقية .من خلال هذه الدراسات نجد أن النمل لة القدرة علي إنشاء أقصر المسارات عند التحرك الي منطقة الطعام وذلك بإتباع المسار الناتج من وجود ماده كيميائية فية تسمى بالفيرمون والتي توضع بواسطة النمل عند حركتها في هذا المسار . هذه الاطروحة تقدم طريقة جديدة وفريدة من نوعها لعمل التوجيه في الشبكات ذات التنظيم الذاتي وهو بروتوكول توجيه يسمى بروتوكول التحسس الذكي للنمل . يستخدم هذا البروتوكول دراسة سلوك النمل في بيئتها التي تعرف بالدراسة المثلي لسلوك مستعمرة النمل لعمل أفضل توجيه للبيانات في هذا النوع من الشبكات , ومع دمج كل من طريقة إستخدام التوجيه عند الحاجة للإتصال وكذلك وجود آلية توفر عدد من مسارات التوجيه مع إستخدام خوارزمية طريقة البحث الحلقى للمسار , نجد أن بروتوكول التحسس الذكي للنمل يعطي أفضل أداء وأسرع مسار وكذلك أفضل طريقة لتصحيح المسار عند حدوث خطأ فية .

في هذه الاطروحة تم دراسة بروتوكول التحسس الذكي للنمل كتطبيق في شبكات تعرف بالشبكات ذات المناطق الخاصة . تم كتابة خوارزمية البروتوكول وترجمتها علي برنامج محاكي الشبكات وبالمقارنة مع بروتوكول التنظيم الذاتي عند الحاجة تمت عملية المحاكاة ودراسة الاداء تحت عدد من الحالات وهي , السرعة وكمية التحرك وعدد الاجهزة المستخدمة في الشبكة . من النتائج المتحصل عليها , نجد أن بروتوكول التحسس الذكي للنمل بالمقارنة مع بروتوكول التنظيم الذاتي عند الحاجة يعطي أقل ضغط وتضخم علي الشبكة وأقل تأخير عند إنشاء المسار لعمل الإتصال كما يضمن نسبة عالية لنقل ال معلومات من المرسل الي المستقبل مع نقصان في أنتاجية الشبكة وكذلك زيادة بسيطة في كمية البيانات التي يتم فقدها عند أستعمال هذا البروتوكول .

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Terminology

ACO	Ant Colony Optimization.
AODV	Ad-hoc on demand Distance Vector Routing Protocol.
CBR	Constant Bit Rate.
DSDV	Destination sequenced distance Vector Routing Protocol.
DSR	Dynamic Source Routing Protocol.
ID	Identification.
IEEE	Institute of Electrical and Electronics Engineers.
IETF	Internet Engineering Task Force.
LAN	Local Area Network.
MANET	Mobile Ad-hoc Network.
NAM	Network Animator Tool.
PDR	Packet Delivered Ratio.
RREQ	Route Request.
RREP	Route Reply.
RERR	Route Error.
TCL	Tool Command Language.
TTL	Time to Live.
UDP	User Datagram Protocol.
WLAN	Wireless Local Area Network.
Wi-Fi	Wireless Fidelity.
WPAN	Wireless personal Area Network.

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