OPTIMIZING ROBOTIC SWARM BASED CONSTRUCTION TASKS

D L T S Jaliya

(189382P)

Degree of Master of Science in Artificial Intelligence

Department of Computational Mathematics,
Faculty of Information Technology

University of Moratuwa
Sri Lanka

Oct 2020

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Dombagoda Liyanage Teshan Shanuka Jaliya

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DECLARATION

I declare that this is my own research proposal and this proposal does not incorporate without acknowledgement any material previously published submitted for a Degree or Diploma in any other university or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Signature: ....   Date:

I have read the proposal and it is in accordance with the approved university proposal outline. I am willing to supervise the research work of the above candidate on the proposed area.

Signature of the supervisor:...................   Date:

ABSTRACT

Construction is a field that grows with technological advancements by the day. The field has always adapted novel and innovative technologies to create marvels of engineering which were thought to be impossible before their time. Having many challenges in the physical construction tasks, there are researchers all over the globe trying to innovate and improve construction related technologies. With the advancements in technology, some construction projects have already adapted robotics in some aspects of the construction process. In this research, we try to introduce a novel approach for construction using swarm robotics.

Behaviour of a robotic swarm is collective and aimed at solving a problem using the collective behaviour. This is similar to the natural animal swarm behaviour of bees/ ants/ termites...etc. Even though there are many researches and developments done in the field of swarm robotics, the concept has not yet made its way into industrial environments.

Many researchers in the field of construction using swarm robots have come up with successful algorithmic approaches for constructing simple shapes. However many of them lack practicality due to the usage of pheromone trails / building blocks with communication capabilities / bots having a real time global view of the state of the construction...etc which are difficult to achieve in the real world with the existing technologies. Furthermore, most similar researches show a serial behaviour in the construction instead of parallel behaviour seen in nature.

In this research we propose a novel and a practical approach for swarm robots for optimizing construction tasks in 2D using swarm robotics concepts. The swarm consists of a set of robots that are practical to implement, with limited visibility and limited communication skills. Having only the local view of the terrain, robots in the swarm construct a given shape in 2D in collaboration with the other robots in the swarm. With the application of swarm concepts in an improved manner, the swarm is able to construct the given shape displaying true parallelism which in turn will improve the construction time.

Constructions using swarm robots is proposed as one of the most practical methods of constructing buildings/ shelters specially for colonizing space where sending skilled workers is too expensive. The implications of this research can be an initiative to such applications.

DEDICATION

To my parents for their dedicated partnership in the success of my life

ACKNOWLEDGEMENTS