



Abstract #1661

English

SELF-REPLICATING MACHINES: FROM THEORY TO PRACTICE

We shall review theoretical work on self-replicating machines to determine any practical lessons that might be learned in translating from theory to practice. Theoretical work on self-replicating machines has strongly emphasised self-assembling systems assuming that complex parts are already available in the environment. Indeed, most practical work to date has similarly emphasised robotic assembly of pre-existing complex modules. For true self-replicating machines, this is insufficient and the entire supply chain from mining to extraction must be considered. Nevertheless, there are useful lessons to be learned from self-assembly models, particularly the central role played by robotic machines in the self-replication process. In theoretical models, they are abstracted as assembly manipulators but practical systems must include mining vehicles, physical and chemical processing plants, 3D printers, manufacturing tooling and assembly manipulators. The core components of these kinematic machines are motors and electronic controllers. Construction of such components from raw materials would constitute an existence proof for practical self-replicating machines.

French

No abstract title in French

No French resume

Author(s) and Co-Author(s)

Dr. Alex Ellery
Associate professor
Carleton University



Profile of Dr. Alex Ellery

General

Email(s): aellery@mae.carleton.ca

Position:

Preferred Language: [Language not defined]

Addresses

Business

Home

Biographies

Biography submitted with the abstract

Prof Ellery is a Canada Research Chair in Space Robotics & Space Technology at Carleton University. He has 170 publications including the authorship of two textbooks in the field of space robotics - An Introduction to Space Robotics (2000) and Planetary Rovers (2016). His interest in robotic in-situ resource utilisation stems from his conviction that the space environment will only open up for viable exploration and commercial exploitation once a robotic infrastructure is emplaced on the Moon, asteroids and Mars constructed from in-situ resources. The only means to achieve this at a reasonable cost will be through self-replicating machines.

Biography in the user profile

Collaborators

Author(s) and Presenter(s)

Author(s):

Dr. Alex Ellery

Associate professor
Carleton University

Presenter(s):

Dr. Alex Ellery
Associate professor
Carleton University