

## 15th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)

### Novel Concepts and Technologies to Enable Future Building Blocks in Space Exploration and Development (3)

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## RESEARCH ON INTELLIGENT FLOATING MARS EXPLORER WITH DISTRIBUTED NETWORKED TECHNOLOGY

### Abstract

Mars has been one of the hottest planets for exploring in future. Until now, human have launched hundreds of planet explorers, while most of them were unable to execute their mission successfully. The landers mostly were fixed or only able to move a limited distance on land. Nearly all of the previous equipments were sent to finish their task independently, which implied high cost, more complex and therefore high failure risk. As Big Data, artificial intelligence, network communication and robotic technologies developed dramatically, it would be more realistically to explorer the out-space planet, such as Mars, using distributed intelligent robots to finish exploring task jointly. Therefore, a new type of Mars exploring robot system is provided in this paper. The system is comprised by one floating mother ship and numbers of little functional robotic execution units. The mother ship, floating in the rare air, has the ability to take enough payloads and move long distance. It can give commands to the little units and release or collect them easily. Each little unit is an independent robot, which can realize a simple task, such as exploring, repairing, energy-supplying, information transferring and so on. In order to simplify the complexity and release risk, the system should be opened, expandable and modularized, which means it can be improved and perfected structurally and functionally by later launch missions. After this, it would be able to execute exploring missions much more organized, efficiently, continuously and reliably. According to the obvious deficiency and urgent demands, this paper gives an overview of Mars exploration development, and describes the framework of the intelligent floating Mars exploration system, reveals the technical solutions and using strategies. Mechanical structure models were established to reveal the system more clearly. Simultaneously, Agent modules of the system were constructed, and interactive simulations were executed to confirm its feasibility for future developments and applications.