

Swarming Robot

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Introduction

A swarming robot is a type of robot that is designed to work in large groups, or swarms, to perform tasks or achieve goals

These robots are often small, autonomous, and have the ability to communicate with each other to coordinate their actions

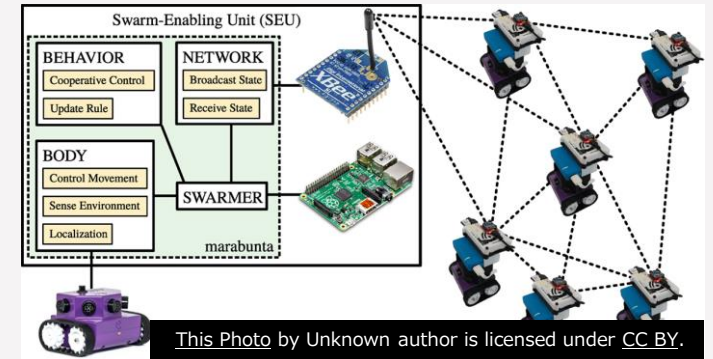


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History

The idea of swarming robots dates back to the 1980s when researchers first began exploring the concept of distributed robotics

Since then, swarming robots have been used in a variety of applications and continue to be an active area of research



Applications



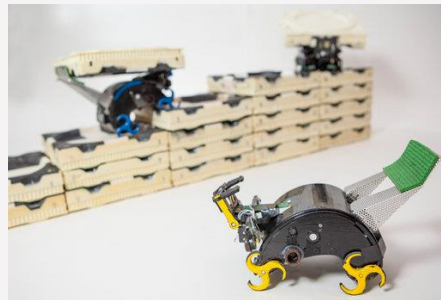
ENVIRONMENTAL MONITORING

Swarm robot will be provided with sensors that detect and measure environmental characteristics. It may cover enormous areas and deliver data in real time. Swarm robots can keep track on air and water quality, weather patterns, and wildlife populations. They provide a powerful tool for gathering comprehensive data over wide areas in difficult settings.



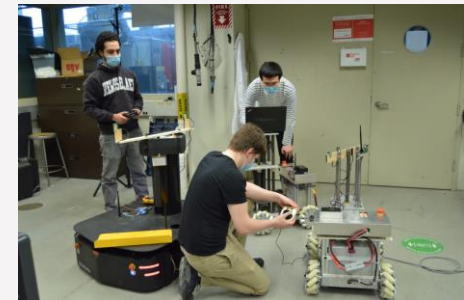
CONSTRUCTION

Each carried out its task in response to what the others did, and if one robot was removed the others just carried on, which means the same instructions can be executed by five robots or five hundred.



MANUFACTURING

The team of robots will work alongside human workers in building the structures, enabling a shorter time to build. Specifically, RPI is working to design, build, and program a team of small human-directed robotic platforms to take on the hard work of holding heavy material, rotating it, and pulling it taut while it is being joined together as part of this project. This project will impact any manufacturing operations where multiple robotic agents act together to accomplish a common objective.





Main Components of the Robot

A swarming robot typically consists of the following components: The design of the robot's body is important for its mobility, stability, and ability to carry out specific tasks

The body may be designed with features such as wheels, legs, or wings depending on the intended environment and tasks

The robot may be designed to move in a variety of ways, such as crawling, walking, running, jumping, or flying

Navigation

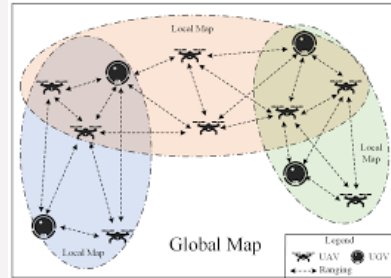
Swarming robots need to be able to navigate their environment and communicate with each other to avoid collisions and coordinate their movements

Navigation systems may include sensors, GPS, or other localization technologies

The robots may use algorithms to plan paths and avoid obstacles



Laser range finders -
Detect obstacles and map
the robot's surroundings.



GPS - provide location information.



IMU - measure acceleration, orientation, and
angular velocity.



Data collection

Swarming robots may be equipped with sensors to collect data about their environment or to perform specific tasks

The sensors may include cameras, microphones, temperature sensors, or chemical sensors

The data collected may be used for analysis or to make decisions about the robots' actions



RFduino



RFduino Functional Prototype



RFduino 3D Rendering



Communication

Swarming robots need to be able to communicate with each other to coordinate their movements and actions

Communication may be achieved through a variety of methods such as wireless communication, infrared, or acoustic signals

The robots may use algorithms to coordinate their actions and avoid collisions

Power management

Swarming robots need to be designed to conserve power and operate for long periods of time on limited battery life

Power management systems may include energy harvesting technologies, efficient power storage, or power-efficient components

