

Department of  
Mechanical Engineering

## Key words

Robotics, Agricultural field, Power assist, Rescue robots, Space robots



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## Consultations, Lectures, and Collaborative Research Themes

Consultations on light labor systems on agricultural works  
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## Main research themes and their characteristics

## [Development of Mowing System]

Thus far, most mowing work was performed manually. However, manual mowings are quite hard work. Therefore, we will develop a small mowing system that can work safely while reducing the burden on workers.

In this research, we are developing a mowing system equipped with two types of mowing mechanisms, a "Trimmer type" that emphasizes safety and a "Frail type" that emphasizes mowing performance. While some mowing systems using engines have been developed, this system have been developed only using battery.

**Trimmer type:**As shown in Fig. 1, mow the grass using a blade like multiple scissors. Since it does not rotate at high speed like a brush cutter, there is no danger of stepping stones, and the fixed blade is designed to be slightly longer, so even if it touches a person, there is almost no injury. In addition, we have devised a mechanism so that even hard stems with a diameter of 10 mm or more can be mow.

**Frail Type:**

Also called hammer knife type, multiple cutting blades are attached on the rotating shaft, and the rotating shaft is rotated at high speed to crush the grass. Another feature is that it does not need to be collected after cutting because it shatters the grass.

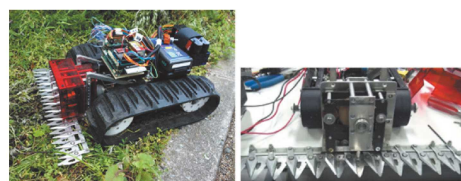


Fig.1 Overview of Trimmer type mowing system

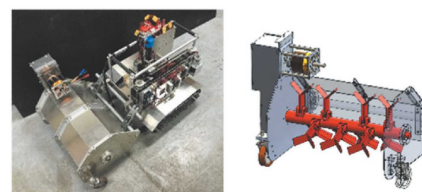


Fig.2 Overview of Frail type mowing system

## [Development of Rescue Support Stretcher System]

Robots have come to be used for disaster control and searching for victims, but rescue work involving human beings requires care too meticulous for robots to handle and that cannot but rely on rescue personnel such as fire fighters. At the same time, we should bear in mind that such rescue work by rescue personnel such as fire fighters puts an enormous burden on them.

In the above context, to provide for all kinds of disasters in underground malls or plant facilities, we have developed a rescue support stretcher system so that victims can be rescued as quickly and safely as possible while the burden on rescue personnel such as fire fighters is reduced to a minimum. Specifically, the proposed system has a crawler belt on both top and bottom surfaces as shown in Fig.3, so that the task of getting victims onto stretchers, which requires a lot of human power, can be done semiautonomously to reduce the burden on rescue personnel such as fire fighters and other rescuers. When it comes to stairs, the rescue support stretcher system starts to employ the bottom crawler to assist power.



Fig.3 Overview of rescue support stretcher system

## Major academic publications

Development of Rescue Support Stretcher System with Stair-climbing, Yuki Iwano, Koichi Osuka, Hisanori Amano, Journal of Robotics and Mechatronics, Vol.25 No.3, pp.567-574 (2013)

Evaluation of a trimmer-type mowing robot, Yuki Iwano, Astunari. Kobayashi, International Journal of Advanced Mechatronic Systems, Vol.5 No.2, pp.80-86 (2013)

Development of the Stretcher with the Vibration Isolator Using Nonlinear-Structure, Yuki Iwano, Satoru Horai, Koichi Osuka, Hisanori Amano, Journal of Robotics and Mechatronics, Vol.26 No.4, pp.496-504 (2014)