Frontiers in Plant Science Special Issue Call for Papers:

Robotics for crop care and breeding

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Introduction

In face of the global challenge to produce more food due to the growing population and climate change, agri-robotics are increasingly playing an important role in sustainable crop production. Robots have been employed for industrial production for decades, leading to fully automated production lines. However, robotic approaches for field sensing and operation in agriculture is much lower and limited, even though there are some tasks which are particularly suited to robotic solutions. Crop care is a very important part of modern farming. The related agri-robotic technologies in the crop care domain include mobile autonomy for row crops, environmental perception such as plant health and stress detection, modelling and decision-making, and action implementation. In plant breeding, robotics can help to upscale the monitoring of key traits by increasing the number of collected data points in both space and time. Specifically, data derived by a variety of imaging and non-imaging sensors, including RGB, multispectral/hyperspectral, LiDAR, fluorescence, thermal and spectrometer from various of platforms (e.g. UAV, handheld and UGV), provides unprecedented amount of information for environment perception. Additionally, the advancements of machine learning algorithms offer a unique opportunity to build reliable and robust models for prediction in agricultural environments.

Potential topics:

• **Weed/disease mapping and monitoring with UAV or UGV**

• **Robotic vision and machine learning for crop care (weed, disease and insect management)**

• **Multispectral or hyperspectral image analysis for early disease classification or detection**

• **Site specific management and field experiment and evaluation**

• **Time-series data analysis for crop status monitoring**

• **Fusion of proximal and remote sensing data for crop care and breeding**

Keywords: Agri-robotics, computer vision, machine learning, data mining, digital phenotyping

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