Chapter 18
Service Robots for Agriculture: A Case of Study for Saffron Harvesting

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ABSTRACT

In general, service robots are described with different characteristics for different tasks. In this chapter, service robots are analyzed as machines in the agricultural field. The mechanization in agriculture is discussed and service robots are described for particular tasks. In particular, the harvesting and treatment of high commercial value products is discussed for robotized applications. A significant case study is described and discussed for a robotized system with the aim to harvest and separate the Saffron flower spice.

INTRODUCTION

Robots can do a lot of things humans can’t. Since the beginning of the enthusiastic automation history, anthropomorphic robots have fascinated designers and inventors, since playwright Karel Capek, in his comedy, introduced the word “robot,” from the Czech “robota” meaning heavy work.

Robotic systems perform many functions such as repetitive tasks. Depending on their function, robots can be classified in categories. The two major classes of robots are the industrial robots and service robots. Service robots can be classified into professional and personal robots. In Figure 1, the number of industrial robots for every 10,000 human workers is referred in 2000.

For Robotic Industries Association, an industrial robot is a machine reprogrammable and automatically controlled in different axes and degree of freedom, which may be in place or mobile for industrial applications.

According to the International Federation of Robotics, a service robot is a machine operating autonomously. Personal robots are service robots...
that assist people, as in domestic robots, carer robots, and robots for entertainment.

In general, the challenges in service robotics activities include all the challenges relative to industrial. Dexterous manipulation and integration of sensing in support of manipulation is fundamental. In addition, mobility is a key challenge for service robotics. Many designers and researchers consider that robots find applications in the so-called “4D tasks,” tasks that are dangerous, dull, dirty, or dumb.

For several years, service robots have been at work where people are at risk: in dangerous and hostile environments or where repetitive operations are done, difficult or disagreeable like under the sea, in nuclear plants, or in space. Today service robots are embarking on a multitude of new activities: picking agricultural products, taking care of the handicapped, cleaning buildings and public areas like parks, or sort plants for security of buildings, factories, and plants, or helping in actions in the presence of terrorist danger. Because service robots are often able to make actions under hazardous or hostile conditions, for example, they may deliver the increased productivity that has eluded the service sector. Another important force driving the advent of service robots is the increasing demand of service workers such as nurses and patient assistants. There are demographic press-...