An Overview of the Literature on Robots

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ABSTRACT

This paper presents a holistic literature overview of worldwide theoretical framework and descriptions of modelling approaches of robots, in particular, mobile robots. The paper also shows the current learning experiences in robot systems. The study results are captured in an integrated, concise and elegantly-distilled way, underpinned with collected data and information. The holistic literature presented here aims to increase our understanding in this widely-expanding field and stimulate a higher level of proliferation of research articles in the field. Generally, the robotics literature is composed of a wide range of studies in diverse areas, notably, industrial applications, healthcare, construction systems and technological education and training, among others. There is a dire need to develop an understanding, founded on scientifically-verified data, of the critical variables and success factors for successful implementation of robotics systems. This may lead to a substantial, sustainable long-term improvement in practical performance results, value for money and effort. A reader of this overview paper would expect pointers in answering these questions. The real value of this paper lies in providing readers with motivated pointers on the details needed to implement robots based on worldwide past experiences and latest thinking.

Key words: Robotics, Automation, Mobile robots, Literature review

INTRODUCTION

There has been a major development in the high-technology literature in all aspects of basic and applied research on the analysis, design, realization and use of robots, robot component and robot systems (Wilson, 1997; Carelli and Oliveria-Freive, 2003; Demirli and Moihim, 2004; Virk et al., 2004). The study of robotics systems is the theory and methodology common to all collections of interacting, functional units that together achieved a definite purpose. Practically, it is concerned with the engineering design of interrelated, flexible automated units in addition to the basic problems of individual robots and robot component. The various subject ranges of the basic robots are defined as mechanics, control and sensor design (Tachi, 1999; Ma et al., 2001; Khoukhi, 2002). Mechanics include the design and structure of manipulators, arms and effectors, hand locomotion, vehicles and peripherals; actuators, power and energy storage; kinematics, dynamics and simulation; control includes both theory (electrical and mechanical control, optimization of paths and