This is ICGST-Template First Line of our Paper Title and this is the Second One

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Abstract

This is the abstract of our paper. The paper discusses the possibilities of rehabilitation robots for elderly and disabled people under the important aspect of (semi) autonomous robot control, which plays a key role in acceptance and economic profitability. Due to the financial restrictions in this area, the user interface, the wheelchair, the robot manipulator, the necessary sensors and the control units are quite different compared with industrial robots. The whole control structure has to be redesigned under the needs of the target group and the financial restrictions. In the paper typical scenarios for the application of these robots and new scientific results are presented.[1]

Keywords: *Autonomous robot, Stochastic control, Kalman filter, Fuzzy logic, Neural Network, Adaptive navigation.*

1 Introduction

We consider that it is necessary to decide a state of the network load in order to adjust an image information quantity responding a state of the network. In this paper, A state of the network load is decided by using a ratio of send and receive of image data communicated between slave site and master site, a receive interval of image receive report and a send completion time of **image data**. The master site reports a received image data quantity to the slave site every a certain time. The slave site decides a state of the network load by making a comparison between received report and image data quantity transmitted until it receive reports. Simultaneously, the slave site decides that the network load is large, in case that it can't receive the report inside a certain time. Also the slave site measures a transmission completion time of image data.

To design Service Robots for elderly and disabled people is a very demanding task. There are fundamental differences in the necessities, compared with industrial robot applications, as well as to several other service robot applications. The tasks vary in wide areas, depending on the actual situation of the user and they cannot be pre programmed as in other robotic applications. While all service robots must be designed for operation in clustered, a priory unknown and variable environments, new demands arise for the support of the target group. The interaction with the user and the variety of the supporting tasks may be mentioned here. On the other hand no total autonomy is demanded. It is rather important to use the cognitive abilities of the users and support compensate they only in areas where physical or cognitive impairments exist. Another limitation is the number of units which may be sold. Closely related to the small number compared with other industrial products is the price of the today available components. The design of a robotic aid must consider these limitation but also possibilities which arise due to the specific users. For the near future, the primary target group are disabled people with serious physically handicaps but only small mental disabilities if at all. Opposite to other service robot applications the cognitive abilities can and must be used to support and simplify the controller design, esp. for environment identification and scene interpretation. The remaining automation of the tasks is still very demanding, but the sensor data interpretation is eased if the user support the automation system. The paper will discuss the design philosophy which results from this approach. An electric wheelchair with an added robotic arm serves as an example. The main target group of this unit are paraplegics ore people with similar handicaps.

The remainder of the paper is organized as follows: Section (2) focuses on .... Section (3) emphasizes on ....

2 Theory

There are two different approaches to the characterization of dynamic systems: In linear systems theory, one can assume either some structure in the signals or some structure in the system. Attempts have been made to combine these two approaches e.g. harmonic identification techniques in the Fourier domain.
First approach: Structure the signal can be found using linear transforms. This approach does not take into account that the system has some structure. In the time domain, filtering is a linear transformation. The Fourier, Wavelet, and Karhunen-Loeve trans-

[1]This study has been implemented at AI Lab., Uni. XYZ

forms have compression Capability and can be used to identify some structure in the signals. When we are using these transforms, we do not take into account any structure in the system.
Second approach: Structure the system can be found by fitting a model to the system.

2.1 System Modeling

Physical models of robots are either reduced-size copies of the original dynamics following the laws of model similarity, or analogies. The idea of an analogy implies that there exists "something" at every instant of time that is to be analogous to the dependent variables of the original physical system. Mathematical models map the relationships between the physical variables in the robot dynamics to be modeled onto mathematical structures like simple algebraic equations, systems of differential equations or even difference equations. Mathematical modeling of robots can be developed in different ways: either purely theoretically based on the physical relationships (sensors actuators Interaction), which are a priori known about the robot dynamics, or purely empirically by experiments on the already existing robot, or by a sensible combination of both ways. Models obtained by the first method are often called priori, first principle or theoretical models, while models obtained in the second way are called posteriori or experimental models. Theoretical model building becomes unavoidable if experiments in the respective system cannot or must not be carried out. If the system to be modeled does not yet exist, theoretical modeling is the only possibility to obtain a mathematical model.

2.2 ARX Modeling

The discrete ARX modeling scheme is derived from Kalman filter, see figure (1). The ARX scheme is widely used in modeling of sequential system dynamics. This structure takes into account both the observed state υ_k and the driving control signal λ_k which is given by:

$$\upsilon_k = \sum_{i=1}^{n_a} a_i \upsilon_{(k-i)} + \sum_{i=0}^{n_b} b_i \lambda_{(k-i)} + \eta_k \qquad (1)$$

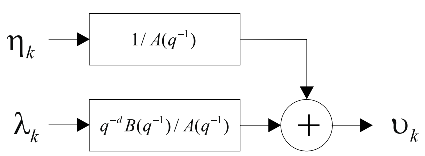

Figure 1: ARX modeling of rescue robot dynamics

Where; η is the modeling residual , representing the white noise. n_a is the model order of the observed state (also called the number of poles). n_b is the model order of the control signal (also called the number of zeros). The operator q^{-1} is the back shift operator or delay, which is given by $q^{-1}\upsilon_k = \upsilon_{(k-1)}$, that follows:

$$\begin{aligned} A(q^{-1})\upsilon_k &= q^{-1}B(q^{-1})\lambda_k + \eta_k \\ A(q^{-1}) &= 1 - a_1 q^{-1} - a_2 q^{-2} - \ldots - a_{n_a} q^{-n_a} \\ B(q^{-1}) &= b_0 + b_1 q^{-1} + b_2 q^{-2} + \ldots + b_{n_a} q^{-n_b} \end{aligned} \qquad (2)$$

The observed state υ_k is the longitudinal velocity/heading while the reference signal λ_k is the obstacles distribution histogram, acquired by laser/sonar. The Gaussian distributed noise, associated with the observed output, facilitates applying identification algorithms such as; RLS or least mean squares (LMS) to estimate model parameters (coefficients). This modeling scheme is only applicable within linear or quasi-linear systems. Therefore, it is applied within this framework to regulate the velocity/heading, while this algorithm failed to cope with position control due to enormous non-linear odometric errors [2, 4, 5, 7, 8, 1, 3, 6].

Important Topics:

- Item 1.
- Subject 2.
- New Data.

3 Conclusion

This is the conclusion. The major contributions of this article arise from the formulation of a new approach, spectral analysis, to the modelling and identification of XYZ and ABC features that provide improved computational efficiency in the positioning techniques. By manipulating the manner in which feature information of both A and BVN signatures is incorporated into the model, it can be shown that significant improvements in the performance of the algorithm can be realised. Moreover, the simplicity and the efficiency of dynamic pose tracking techniques succeeded to improve the robot pose estimation process.

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