Future in Field of Robotics

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Abstract -- In recent trends in industrial robot applications First of all, demand for a new generation of control platforms Separation of a robot and a human is a paradigm shift Worker with fence and light curtain towards work environment In which humans and machines work together very closely close range. Second, the priority of professional off-the-shelf is Hardware (COTS) dedicated for affordable hardware Applying cots hardware in performance and safety reasons Important system is a trend which is already in widespread use in the areas Public transport or public safety, assuming the possibility. To design low cost systems as well as low hardware. Increasing computational dependency of specific manufacturers. The power to represent less needs for special hardware, as well as Renewal of the ongoing development of Virtualization Technologies Possibilities to deal with redundancy, press this development above Until now, this approach is only used for non-security related parts Increasing the complexity of the field of industrial automation Art goes towards the use of automation system More powerful CPU, ideal standard industrial pc this work Recognizes and analyzes possible exclusion norms for COTS Solutions to IEC 61508 Security Integrity Level (SIL) 3 Conceptualization of concept of proposed system is theoretically Analyzed in connection with the state's performance of art Hardware. Addition estimation of order of magnitude For the effect of calculation performance using arithmetic Code is given on native execution.

I. INTRODUCTION

Whereas instead of learning robots, a large area is included, by learning to understand, plan, make decisions, we will focus on this review especially on topics of learning control, because it is simulated or actual physical robot. [1]. In general, learning controls refers to the process of obtaining a control strategy for a particular control system and a particular task by trial and error. Learning control is usually different from adaptive control [2] Control of learning for at least three decades has been an active subject of research. However, the lack of working robots, who actually use learning components, will need to work more before learning robots, making it beyond the laboratory environment. This article will evaluate some ongoing and past activities in the robot where it will be located where it is located and where it is going. [1] Generally, the wheeled robot has been detected in [3] -6], and we insist on learning discrete state-verb spaces rather than continuous state-spaces [7], [8] We will describe various topics of robot learning with examples from our own research with anthropomorphic and humanoid robots.

II. WIRELESS SENSOR NETWORKS

Multi target Tracking and a Chase Theft Game (PEG) Darpan Nest performed in the last experiment On August 30, 2005. In this section, we summarize Report of experimental results in The experiment was largely, long time, External sensor network test bed posted on a miniature Grassland at Richmond Field Station of UC Berkeley (see Figure 1). A total of 557 sensor nodes were deployed and 144 These nodes were allocated for tracking and peg Experiments However, used in six of these 144 nodes The experiments were not working on the day of the demo, Large-scale, shows the difficulties of deploying outdoor System The sensor nodes were deployed almost At 4-6 meters in 12? 12 grids were each sensor node To prevent passive use of camera tripod high

(a) (b)

Fig. 1. Hardware for the sensor nodes. (a) Trio sensor node on a tripod. On top is the microphone, buzzer, solar panel, and user and reset buttons. On the sides

are the windows for the passive infrared sensors. (b) A live picture from the two-target PEG experiment.

Infrared (PIR) sensor due to blocking of grass Uneven terrain [see picture 1 (A)] true places The ducts were used during the deployment using differentiators Global Positioning System (GPS) and stored on a table on it Base stations for reference, however, in experiments. The system assumes that the nodes were placed at exactly one 5-m spacing grid to highlight the strength of the system against localization error.

III. ROBOT MACHINING

Current European research vision is mainly influenced from these challenges related to competition and sustainability. The strategic goal of enterprises has been shifted from cost-based Manufacturing with high-value added products Technical innovation and structural changes are in this scenario manufacturing system development and research increased Reconfigurable, flexible and highly automated systems Investigated, developed and adopted to deal with Increase in optimization of products and variance Volume of production.

Extending g the field of application of IR from manufacturing Compared to machining, if there are many major benefits compared to its State-of-the-art machining systems, such as high efficiency, Large workspace, and fast and easy (re) configurations Both state-of-the-art machining solutions and strategies Commercial and research allow limited access to robots Specialty by following the range of machining operations Dimensional and Geometric Tolerance, and Less Contact Forces.

In addition, there are many offline programming vendors Implemented analog calibration methods and processes ABB Robot Studio® first developed a dedicated calibration. The name of the package is Teach Saver [13], while in the previous release A calibration tool is proposed for the software's cutting power pack. Fanqie Roboid has its own process for virtual alignment and the real world [15] Declaim Power Loom Robot Interface There is a dedicated calibration function for tool frames. Calibration Such approaches display a useful Application on the store floor but their self-learning process Do not allow any automatic execution, and reference points to be taught is not always clearly identified.

IV. ROBOT HAND

Is overwhelmed with incredible progress in the world Engineering This progress has happened in the production Many robotics that are currently being used in different ways Use of Industry (Miller, 1989) (Edwards, March 1984) Robotics not only allows more productivity and security Save time and money on the workplace, the robot's history Development goes back to the ancient world (history of Robot, 2014). All this started with the original idea and reached at a point where today there are the most complex and risky tasks y this rapid development As a result, complex robots are produced (Kopacek, 2005) And intelligent control algorithms (Saradis, 1983).

In the past has been researched and resulted in many people Control algorithms were proposed (Marchal-Crespo & Reicensmesseer, 2009), (HSIA, 1986), (Hashimoto, 2003), being Robot (Correnne, 1985) being controlled b (Abdullah, Dawson, Dorto, and Jamsheddi, 1991), (Lorenzo & Sicilyo, 2000), (Ali, Noor, Bashi, and Marhan, 2009) and (Uncle Olero, 2004). Theoretical basis Control of pneumatic system J. L. Shearer did in 1956 (Shearer, 1956) Pneumatic system is widely used In Robotics (Deshpande A, Ko, Fox, and Matsuka., 2009) (Shadow Digner Hand E1M3R, E1M3L, 2013), Food Packaging (Wang J, 1999), Construction (Choi H-S, 2005), Biomactics Industry (Verrelst, Vanderborght, Ham, Bel, and Lefeber, 2006) and manufacturing applications (Shaojuan, 2008). In this letter we will present the detail first Classification of control system and then review related Work done in the past, especially our attention The control applied to the pneumatic will be on the algorithm Using System PID Controller, Bang-Bang Controller and Back stepping controller We will test these controllers An undecided robot to find on the hands and compare the results he best option is to run such devices

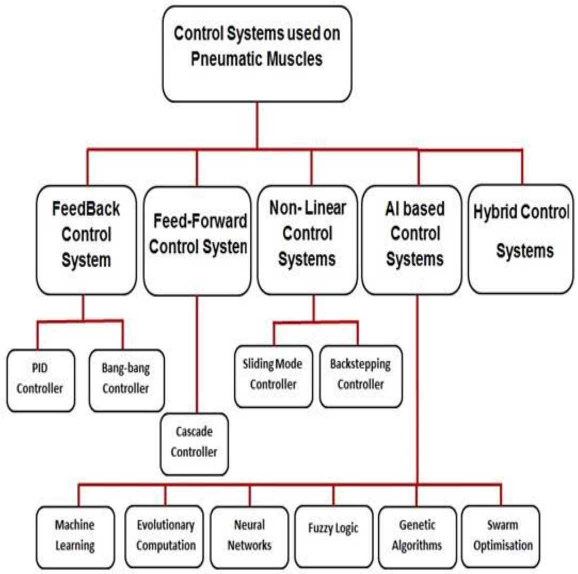

Fig. 2. Classification of control algorithm implemented on pneumatic systems

V. RELATED WORK

A. PID Controller

The proportion of PID is proportional, integral and derivative. this is Due to the most used controller in the industry till now Its simplicity and strong performance under its operation Conditions. PID controllers are actually used widely Robotics field, they can run either motorized systems, such as Act Hands (Deshpande AD, Ko, Fox, and Matsuka, 2009) and Shadow Hand (Shadow Dexteras Hand) E1M3R, E1M3L, 2013). In (Tsujiuchi N, Koizumi, Kan, Takeda, Kudawa, and Hirano, 200 9) and (Jiang, Xiong, Sun, & Xiong, 2010), PID controllers were used to regulate both System position and pressure of his muscles The similar concept of the loop was applied to the robot's hands (Nishino, Suzuki, Koizumi, Komatsubada, Kudawa, and Shimizu, 2007), (Suzuki N., Koizumi, Nishino, Komatsura, Kudawa, and Hirano, 2008). In (Wang, Pu, and Moore, 1999).

A control strategy using revised PID Proposal to get controller and pushing device Position and time accuracy required for the job PID is also Combined with artificial intelligent controller for some time Neural Network can be seen as the best results to achieve (Ah and anh, 2006) or (J. Wu, Wang, and Xing., 2010) or Fuzzy logic in (anh and eh, hybrid control of pneumatic artificial muscle (PAM) robot arm using an inverse NARX fuzzy model, 2011). An adaptive fuzzy PD controller and adaptability of such controller with pneumatic servo system was presented in (Xiang & Zheng, 2005). In (Tu & Kyoung, 2006), a non-linear PID controller and neural network is used to improve the control of PAM suitable for plants with nonlinearity uncertainties and disturbances. Particle swarm optimization (PSO) algorithm is used in (Yanbing & W.Xiaoxin, 2010) to self-tune PID controller of a joint introduced.

B. Bang-bang Controller

Bang Bang controllers are a non-linear style of reaction The controller is also known as Off-Off Controller or Hysteresis Controller It is used to suddenly switch between two states Bang-bang controllers are widely used in systems which accept The binary input system decides to turn on the controller or On the basis of thresholds and target values, band bang control, 2014). Regular and Bang Bang is the application for control (Osmolovskii and Maurer, 2012) discussed in great detail. Bang-bang controller is not popular in robotics because its Shooting tasks are not easy (Silva and Trelett., 2010) and Need regularization (Bonnard, Callao, and Trelett, 2007). Fuzzy Logic (Nagi, Perumal, and Nagi, 2009), (Nagi, Julkarnain, Nagi., 2013) and PIDs are usually associated with Bang-bang

Adjusting the flexibility to the controller and scheduling time Bang-Bang inputs in Bram Vanderbut et al (Ham, Verrelst, Daerden, and Lefeber, 2003), (Verrelst, Vanderborght, Vermeulen, Haim, Nouadet, and Leffeber, 2005), (Vanderborg

B., Verlest, Hamm, and Leffer, running a bilateral Robot, implemented by the Pulmonary Pneumatic Artificial Muscles, 2006) (Vanderborg B, Verlest, Hamm, Damme, and Leffer, A

Pneumatic bilateral: experimental walking results and Compliance Optimization Experiment, 2005), (Vanderborg, Bram, Hamm, Verlest, Damme, and Leffeber, 2008) and (Vanderborg B, Verlest, Hamm, Vermulen, and Leffer, Activated with a dynamic control of a walking robot Pneumatic Artificial Muscles, 2005) Controlled by a bipedal robot Powered by Pneumatic Pneumatic Artificial Muscles Using Bang Bang Pressure controller Stephen M. Caen et al (Can, Gordon, and Ferris., 2007), locomotor adaptation to study Ankle-foot orstrost powered using two different orthoses control methods.

C. *Back stepping Controller*

Back stepping is a control technique that is basically infiltrating In 1990 Peter V. Kakotopia offered to stabilize control with one Recursive structure based on derivative control. And it was Mohammed et al limited to non-axial dynamic systems Synthesis of a non-linear controller in an electro.

In the pneumatic system (Mohammed, Xavier, and Daniel, 2006) Nonlanline backstopping control and non-filer sliding mode Control laws were implemented in the system under consideration. First of all, the electro was a non-linear model of pneumatic system presented. It was transformed into a non-streak annexes model And a coordination change was made possible by then Two types of non-axial controller implementation Align line control laws were developed to track the desired track Position and desired pressure were also experimental results Presentation and discussion p. Carbon ell et al. Compare two Mechanism ie sliding mode control (SMC) and Backstepping Control (BSc) (CarbonWell, Xiang, and Rep., Non-linear control of the acting of a pneumatic muscle: backstepping versus sliding-mode, 2001) and found that BSc is

Better to control any device than SMC Further BSc in Fuzzy Logic (Carbonel, Jiang, and Rep., A fuzzy backsteping controller for one Pneumatic Muscle Actuator System, 2001) (Soltanpour & Fateh., 2009), a similar robot project has been discussed which is Controlled by bsc.

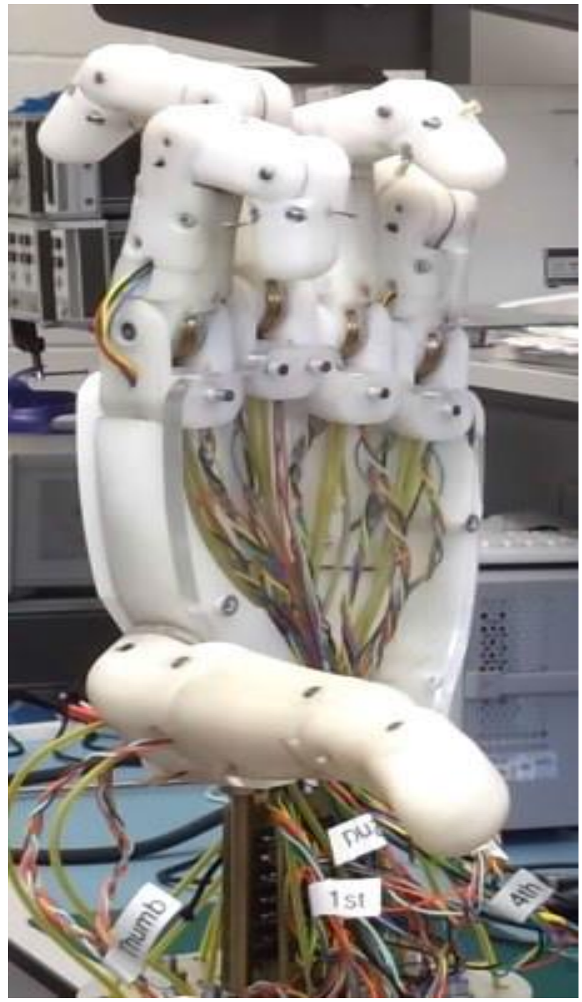

Fig. 3. Ambidextrous Robot Hand

VI. IMPLEMENTING THE EROBOTICS APPROACH

The research area of e-robotics is intended as an intuitively Advanced ERS technologies are used in advanced In robotic applications and engineering [1] [15] as Pictured on the left side of Figure 4, e-robotics applications Cover all aspects of VR on one side, attractive virtual Environment and Visualization support e-learning scenarios By helping to understand complex mechanisms and correlations, Especially when they do not present to the people Depending on the other in depth in the specific area of specialization Hand is complicated enough to be used as a e-robotics system A full featured engineering tool to support development By mixing process aspects in ESS systems engineering In both areas, there may be mandatory virtual training scenario Realized. There are huge possibilities about all these domains Approval and motivation by enriching them with ideas gamification.

A. Combining Simulation and Rendering in an eRobotics-Capable Multi-Domain VR Simulation System

It is still a challenge to develop a comprehensive multi-domain VR simulation system with capabilities Work as a development base in a wide range of applications Regions Exact simulation and combination of A Modern rendering structure is a key feature of e-robotics System Modern software design patterns, as well as Concepts of Earth World's Model and Graph Databases Provide new opportunities for the development of a new one The range of modern multi-domain VR simulation systems As shown in the Figure 4, there is an important consideration Based on simulation and rendering components on a central,

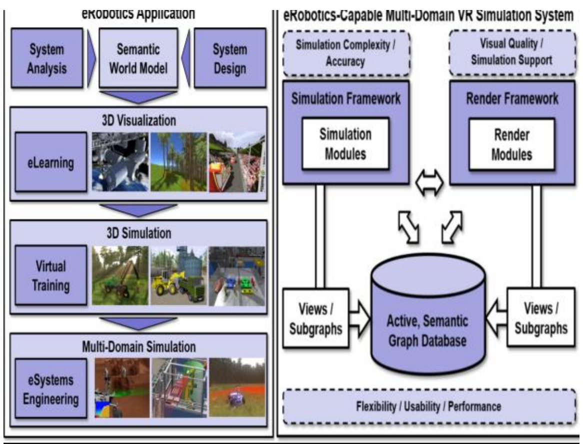

Figure 4. Left: eRobotics applications cover all aspects of VR. Model descriptions are based on semantic world models. Right: an eRoboticscapable system implements these concepts with the close interplay of a central semantic graph database and a modular simulation and rendering framework.

Active and Expandable Object-Oriented Graph Database The approach gives close interaction between all the modules involved Each module can define your own view of the database And integrate subgraphs to meet your specific data structure. Requirements. The meaning database also acts as connecting Element between the simulation and rendering framework And provides inter-communication between them. A monogram Other elements can be created by adding references, Defines an arbitrary set in addition to the edges within this type Database.

According to the elasticity requirements to make a feel Durable and manageable system, a modular architecture is important. Micro-colonel pattern is a popular approach Complexity addressed to the complexity problem originally developed Operating system and embedded systems, this can also be Have applied for simulation systems to adapt to change Conditions. The main idea is to separate a minimum functional Expanded functions and core from project-specific parts As shown in fig 5, the micro-kernel defines very much Works also as frame infrastructure and socket For these extensions, plugging and coordinating help.

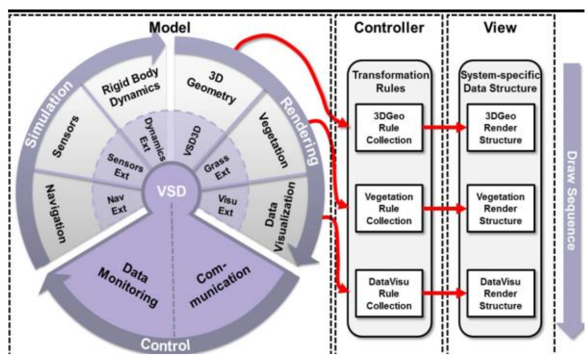

Figure 5. Illustration of the micro-kernel-based system and plugins, which add new functionalities, semantic elements and transformation rules for the transformation of semantic data structures into rendering-specific ones.

Looking at the realized system, it is a micro-kernel Completely called "Versatile Simulation Database" (VSD) [16] Implemented in C ++, VSD provides further centralization Data management, meta information, Enables communication, persistence, and user interaction Convenient integration of plugins in simulation Systems that provide functionality with new algorithms And the self-defined database element finally presented Building the ideal base to realize active database concept MVC pattern plugins can integrate conversion rules which Converting a semantic data graph into domain-specific data

Structures For example, the 3D geometry plugin defines one Set of semantic nodes (VSD3D), which includes basic nodes Geometric Elements, Texture Nodes, Content Nodes, e.t.c. Which can be used for the visual model in "natural" Fashion A set of rules (controller) is also defined VSD3D which has optimized a rendering of semantic nodes Data structure (view) automatically, using Data monitoring possibilities provided by VSD Used models are fully decoded with system-specific Requirements. This technique facilitates easy modeling and With the efficient integration of modern rendering techniques From realistic geological weather to weather effects advanced Data Visualization Techniques.

B. *Rendering-Supported Simulation*

Modern rendering techniques and attractive virtual world Not only reduce the development of virtual testbeds and support Understanding simulation results, they are also beneficial To improve specific performance and accuracy Simulation functions, as illustrated in fig 4, all components In a erobotics-enabled multi-domain VR simulation The system can interconnect the rendering structure Assuming actively support specific simulation processes Optical sensor emulation, the benefits that arise First of all, a real-looking virtual environment increasing the accuracy directly when using submitted images

Second, advanced as input for digital camera simulation Rendering techniques can be applied to other optical simulation Sensors like Time-to-Action (ToF) cameras or laser range Scanner (Leader) with high accuracy Figure 6 tells how an application can request a sensor The data stream through a sensor intangible layer. This layer Runs and offers a simulated or a real-world sensor Acquisition of data to apply for further processing. In An ideal case, the application does in the same way Fake and real-world data normal simulation. The process is a simulation plugin that can apply Providing the techniques and data provided by rendering Framework to support true real-time sensor simulation Figure 7 shows a rendering-supported structure Camera simulation plugin.

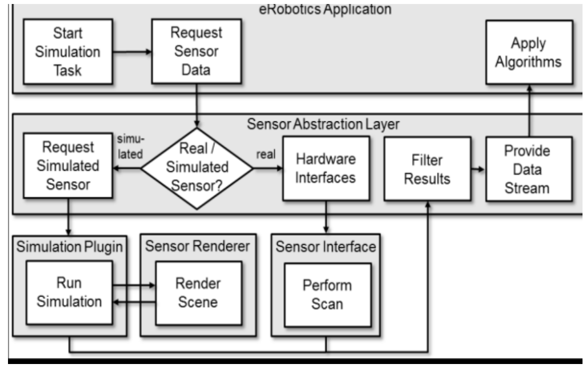

Figure 6. A hardware abstraction layer decouples application development from the applied sensors, regardless if real world or simulated ones.

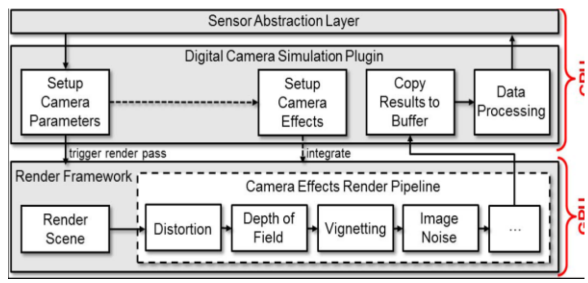

Figure 7. Structure of the camera simulation plugin, which applies a chain of post-processing effects to properly simulate typical camera effects.

VII. NEURAL Q- LEARNING

In this work, the neural Q-learning training algorithm is Has Developed. This training algorithm is composed of two The training stages are fully based on the initial training phase Q-learning algorithm while second training phase Detailed implementation of ANN training process The Neural Q-Learning Training Algorithm is as follows:

A. *Initial Training Phase: Q-Learning Training*

Capture Initial State of each Q-Learning Training Cycle Capture current the environment Each State 10 parameters. State at any given time, st, is represent mathematically as below:

st = [dst0 dst1 dst2 dst3 dst4 dst5 dst6 dst7 dtt _tt]

Where dst0 - dst7 indicates 8 sensor readings The closest obstacles to the mobile configuration Robots on the fixed angle from the current position. DTT is

Relative distance from the current center of mobile robot the collective position and position of the target? Is t an angle relative to the current forwarding of the mobile robot the axis in the position of the target is eight left- The right sonar sensors are shown on Team Amigo BotTM in Figure 8:

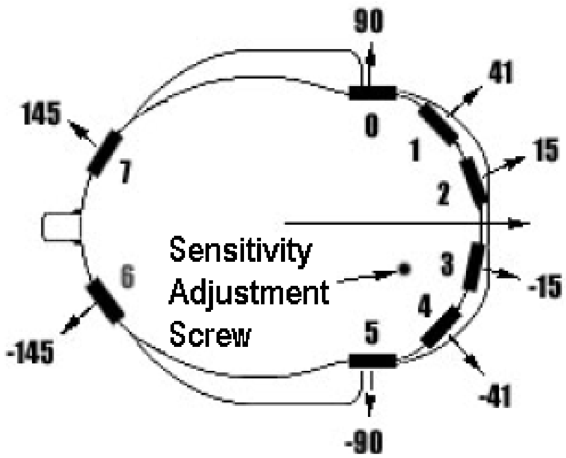

Figure 8: 8 Left-to-right Sonar Sensors on Team Amigo BotTM

B. Second Training Phase: Artificial Neural Network (ANN) Training

Final output obtained from last Q-learning Every set of training phase is the optimum state-verb table Data that consists of 10 elements serve as training ANN samples each column of training matrix A state represents two types of ANN and Trained: (i) Back reproduction feed forward neural network, And (ii) the nerve of MATLAB's competitive learning network is used to create and train both Network Integrated with Best Display Network Q-learning controller aims to enable ANN Controller for learning from your environment, and its improvement Learning the environment through learning can be Supervised learning (and learning) and unsafe Learning (Self Organized Learning) Supervised Studies Learns with an external "teacher" (or supervisor) who Presents training set to network, while unscripted No external "teacher" is required for learning

VIII. CONCLUSIONS

Recent trends of learning robots are to use trajectory-based Optimal control techniques and reinforcement scale learning Compound robotic systems on one hand, increased computational Power and multi-processing, and on the other hand, Practical reinforcement learning methods and work Approximation, contributed to a rapidly growing interest Learning robots has helped tremendously in learning To begin learning with appropriate initial behavior However, many applications are still restricted to low-dimensional Domain and toy applications will be the work of the future Continuous and autonomous teaching must be demonstrated Abilities, which were told in the introduction.

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