MANIPULATION ROBOTS pdf

1: www.enganchecubano.com Internet Controlled Robots (beta)

Nonprehensile manipulation primitives such as rolling, sliding, pushing, and throwing are commonly used by humans but are often avoided by robots. Dynamic nonprehensile manipulation raises challenges in high-speed sensing and control, as the manipulated object is not in static equilibrium throughout the process.

NASA is now poised for its next great transformation: Here on Earth, robots are performing increasingly complex tasks in ever more challenging settingsâ€"medical surgery, automated driving, and bomb disposal are just a few examples of the important work of robots. In space, robots deployed at planetary bodies could construct and maintain space assets, autonomously explore difficult terrain, and even clean up space debris. Future exploration opportunities will be limited only by our imagination. An ambitious robot revolution will foster creativity and innovation, advance needed technologies, and transform the relationship between humans and robots. Key areas of research include: Extending our manipulation and sampling capabilities beyond typical instrument placement and sample acquisition, such as those demonstrated with the Mars rovers, could make ever more ambitious robotics missions possible. Machine perception and computer vision: Our ability to control robot functions remotely is severely constrained by communication latency and bandwidth limitations. Autonomous mobile robots must be capable of perceiving their environments and planning maneuvers to meet their objectives. The Mars Exploration Rover MER mission demonstrated stereo vision and visual odometry for rover navigation; future missions could benefit from the development of robotic systems with advanced machine perception and computer vision technology. We are developing path-planning technologies for robotic vehicles operating in a variety of planetary environments. The graphical user interfaces GUIs and scripts currently used to create robot command sequences for operating rovers on Mars could be insufficient for future robot missions in which we need to interface with multiple dexterous robots in complex situationsâ€"including interactions with astronauts. At a minimum, we need to develop a more efficient way of commanding robots. Over the past 20 years, JPL has developed and tested numerous robotic systems for space exploration on, above, and below the surface of planetary bodies. These include robots that are capable of assembly, inspection, and maintenance of space structures; robots that are capable of conquering the steepest slopes and accessing ever more challenging science sites; and mobility platforms that are capable of exploring the underside of ice sheets in frozen lake or ocean environments. Technologies developed for this robot include onboard 3D terrain modeling and analysis for grasping, force-controlled tactile grasping, optimal gait control, and remote visual terrain-traversability estimation. The system has been demonstrated and evaluated in a 6-DOF degrees of freedom microgravity gantry with terrain simulants and a microgravity simulation environment. RoboSimian can assist humans in responding to natural and manmade disasters and can contribute to other NASA applications. RoboSimian uses its four general-purpose limbs and hands to achieve passively stable stances; establish multipoint anchored connections to supports such as ladders, railings, and stair treads; and brace itself during forceful manipulation operations. The system reduces risk by eliminating the costly reorientation steps and body motion of typical humanoid robots through the axisymmetric distribution of the limb workspace and visual perception. Conceptually, Axel is a mobile daughter ship that can be hosted on different mother shipsâ€"static landers, larger rovers, even other Axel systemsâ€"and thereby can enable a diverse set of missions. The sampling tool has two blades that could be driven into the comet surface by springs in order to acquire and encapsulate the sample in a single, quick sampling action. This capability is achieved with only one actuator and two frangibolts, meeting the mission need of minimized tool complexity and risk. A prototype of the tool has been experimentally validated through the entire sampling chain using an innovative suite of simulants developed to represent the mechanical properties of a comet. Replacing manned resupply missions with these autonomous UGVs could improve the logistics support of soldiers in the field. JPL performed a trade study of state-of-the-art, low-cost sensors, built and delivered a low-cost perception system, and developed the following algorithms: The first version of the low-cost perception system was field-tested at Camp Pendleton against the baseline perception system using an autonomous high-mobility multiwheeled vehicle. Nearly all of the algorithms have been accepted into the baseline and are now undergoing verification and validation testing. Part of a DARPA project to create a legged robot that could function autonomously as a packhorse for a squad of soldiers, LS3 system capabilities include local terrain mapping and dynamic obstacle detection and tracking. The local terrain-mapping module builds a high-resolution map of nearby terrain that is used to guide gait selection and foot planting and that remains centered on the vehicle as it moves through the world. The local terrain-classification algorithms identify negative obstacles, water, and vegetation. The dynamic obstacle module allows LS3 to detect and track pedestrians near the robot, thereby ensuring vehicle safety when operating in close proximity with soldiers and civilians. After five years of development , LS3 is mature enough to operate with Marines in a realistic combat exercise. In collaboration with Google, JPL has demonstrated accurate and consistent 3D mapping that includes constructing detailed, textured models of indoor spaces in real time on memory-constrained systems. This capability is required to navigate safely among other vessels; it also supports mission operations such as automated target recognition, intelligence, surveillance, and reconnaissance in challenging scenariosâ€"low-visibility weather conditions, littoral and riverine environments with heavy clutter, higher sea states, high-speed own-ship and contact motion, and semi-submerged hazards. Contacts are then tracked to build velocity estimates for motion planning and vessel type classification. This technology can be used for robust surface-relative navigation, high-resolution mapping, and moving target detection. ARES-V employs two small quadrotors flying in a tandem formation to demonstrate adaptive resolution stereo vision. The accuracy of the reconstruction, which depends on the distance between the vehicles and the altitude, is adjustable during flight based on the specific mission needs. Applications of this technology include aerial surveillance and target-relative navigation for small body missions. Planetary rovers have traditionally been limited by the available computational power in space: When driving autonomously, the limited computation means that the rover must stop for a substantial period while the navigation software identifies a hazard-free path using acquired imagery. What would currently take many seconds or even minutes on state-of-the art radiation hard processors can be accomplished in microseconds using FPGA implementations. Fast Traverse technology has already been implemented, tested, and demonstrated on a research rover. These UAVs are able to conduct sorties many times per day for several months without human intervention, increasing the spatial resolution and temporal frequency of observations far beyond what could be achieved from traditional airborne and orbital platforms. This method also extends observations into locations and timescales that cannot be seen from traditional platforms, such as under tree canopies and continuous sensing throughout the diurnal cycle for months at a time. SAUVE could develop and demonstrate capabilities for autonomous landing and recharging, position estimation in-flight with poor GPS, and in-flight obstacle avoidance to enable unattended, long-duration, and repetitive observations. The program objective is to demonstrate the technical viability of an independently deployed unmanned naval vessel under sparse remote supervisory control robustly tracking quiet, modern diesel-electric submarines. In particular, JPL will support motion and mission planning and provide the health management capabilities for the robotic platform during its day mission. AUV provides intelligent onboard autonomy to manage systems, self-adapt, and react to changing conditions related to mission objectives, resource constraints, and science opportunities in the environment. AUV also conducts onboard adaptive sampling algorithms to detect features of interest, follow relevant signatures, and adaptively build physical process models. AUV offers enhanced robotics and science exploration capabilities for marine environments at a reduced cost. BioSleeve incorporates electromyography and inertial sensors to provide intuitive force and position control signals from natural arm, hand, and finger movements. The goal of this effort is to construct a wearable BioSleeve prototype with embedded algorithms for adaptive gesture recognition. This could allow demonstration of control for a variety of robots, including surface rovers, manipulator arms, and exoskeletons. It has energy-absorbing, lightweight legs that provide for landing on natural terrain. Aerogel insulation and a heater keep the interior warm at night, and solar cells are used to recharge the battery. Testing with engineering prototypes has been done in a foot vacuum chamber that replicates the atmosphere on Mars, allowing characterization of blade aerodynamics, lift generation, and flight control behaviors. Such large telescopes cannot be folded into a conventional rocket payload and, therefore, must instead be assembled in space from smaller components. ISTAR provides integrated robotics system concepts and matching telescope design concepts for a large space telescope mission, including lab demonstrations of telerobotics assembly in orbit. Using an airbearing table to simulate microgravity in two dimensions, the IRIS robot has demonstrated adhesively anchored walking, free flying using microthrusters, and transitional operations takeoff and landing. The robot will carry a relevant contact inspection instrument and demonstrate the use of that instrument, including the generation of the adhesive reaction forces necessary for the use of the instrument. The robot uses hundreds of sharp claws called microspines that adapt to a surface independently to create secure anchor points. Caves provide a chance to test the robot in all gravitational orientations for future missions to caves on Mars and the Moon, or for missions to asteroids, where a mobile robot could have to grip to the surface to avoid falling off. Using internal actuation to hop and tumble across the surface of a new frontier, Hedgehog is a minimalistic robotic platform for the in situ exploration of small bodies that has minimal complexity and is capable of large surface coverage as well as finely controlled regional mobility. The rover has positive buoyancy, allowing it to stick to the ice underside and operate using similar control principles as those used for traditional aboveground rovers. The system has been tested in thermokarst lakes near Barrow, Alaska, and data from onboard video and methane sensors gives scientific insight to the formation and distribution of trapped methane pockets in the lake ice. The work done combines prototyping, testing, and analysis to mature the balloon technology for first use by NASA in a planetary mission. Planetary balloons are a direct extension of the balloon technology that has been used on Earth for the past two centuries.

2: One-armed manipulation robot runs Linux and ROS

The power to manipulate robots and cyborgs. Variation of Technology Manipulation. User can control robotic entities such as robots, cyborgs, androids, biobots, bionics, nanobots, software agents, internet bots and more to do their bidding or fight for them as well as empathize and communicate.

This is a client software of a multiagent system. The software provides a display of terrain map showing the current location of the mobile robot while also displaying actions performed by the robot and the condition of its systems, such as that of battery power, link capacity, temperature, and power reserve. Intuitive Touch Screen Design The software has an intuitive interface that does not require special knowledge or skills from the user to operate. If necessary, control screens can be added to the application interface for additional transportable equipment. In particular, for the protection of the robot the operator, interface screens can provide additional online video and ability to work with video archives. When used together, the software of Rover S5 robot can provide a UAV drone management screen, complete with an interface to control takeoff and landing of the UAV drone. To solve the problems associated with work conducted in large areas and involving the use of large numbers of robots, SMP Robotics continues to enhance special software with elements of artificial intelligence. Problems with managing large groups of robots intelligent agents are very complex. Such problems often do not have a complete algorithmic solution, due to incomplete environment knowledge, unsteadiness, and the presence of unpredictable events that lead to failure of individual robots. Additionally, other factors are difficult to manage with formalized solutions to effecting practical cooperation of robot groups fitting to real environments. SMP Robotics continues to work on such artificial intelligence algorithms to solve real-time needs of large entities over a variety of terrains and other conditions worldwide. Multi-Robot Missions At the same time, solution control groups of robots can more fully reveal the capabilities of mobile robotic systems to maximize the effectiveness of their use. The approach for the successful solution of a nontrivial class of problems is based on three components: First, the number of robots per unit in a selected area should be sufficient to cover the area, and possibly redundant as a direct solution to the problem while supporting long-range improvements for example, most of the robots used for security are on predefined route, and those robots provide a small part of exploring new optimal transportation routes. Second, such solutions can provide a continuous communications channel between neighboring robots or robots between any of the groups as a whole. Free circulation of information is necessary for its continual updating, providing access for all bots to successful strategies for solving local problems, and continuously moving toward a local dynamic reallocation of objectives. Exchange of information between agents assumes its optimal structuring and formalized solutions as with respect to the state of each robot in relation to the environment. A continuous exchange of information between intelligent agents suggests groupings of robots as a single super organism. Third, extensive problem-solving is moving toward the dynamic definition of specialized subtasks for each of the robots to successfully solve robot group problems in general. For example the Hazmat Robot is the only link in the transmission of information to the robot and performs as a task scout; in this case, the Hazmat Robot must postpone the task of hazmat care, despite the fact that it is a priority for the group as a whole, while ensuring a link to perform reconnaissance tasks. Recombination of the objectives is possible under two conditions: Computing and sensory capabilities of intelligent agents as robots cannot handle information about the environment in general, so each of the robots has a fragment of knowledge. However, this group of robots in general has full, reliable information on the environment and other robots as an integral component of its environment. How this software works is quite difficult to explain in a few paragraphs. We spent more than five years on these developments, which was conducted by a large team of robot programmers and developers. In continuing efforts toward full robotics-based solutions immersion, we have started preparing a special training course for setting up and operating such hardware and software.

3: Virtual Submerged Floating Operational System for Robotic Manipulation

An industrial robot is comprised of a robot manipulator, power supply, and controllers. Robotic manipulators can be divided into two sections, each with a different function: Robot Arm and Body.

Future of robotics Various techniques have emerged to develop the science of robotics and robots. One method is evolutionary robotics , in which a number of differing robots are submitted to tests. Those which perform best are used as a model to create a subsequent "generation" of robots. Another method is developmental robotics , which tracks changes and development within a single robot in the areas of problem-solving and other functions. Another new type of robot is just recently introduced which acts both as a smartphone and robot and is named RoboHon. Robot Operating System is an open-source set of programs being developed at Stanford University , the Massachusetts Institute of Technology and the Technical University of Munich , Germany, among others. It also provides high-level commands for items like image recognition and even opening doors. It would relay this data to higher-level algorithms. Microsoft is also developing a "Windows for robots" system with its Robotics Developer Studio, which has been available since Much technological research in Japan is led by Japanese government agencies, particularly the Trade Ministry. Generally such predictions are overly optimistic in timescale. New functionalities and prototypes In , Caterpillar Inc. In , these Caterpillar trucks were actively used in mining operations in Australia by the mining company Rio Tinto Coal Australia. She can read newspapers, find and correct misspelled words, learn about banks like Barclays, and understand that some restaurants are better places to eat than others. A worker could teach Baxter how to perform a task by moving its hands in the desired motion and having Baxter memorize them. Any regular worker could program Baxter and it only takes a matter of minutes, unlike usual industrial robots that take extensive programs and coding in order to be used. This means Baxter needs no programming in order to operate. No software engineers are needed. This also means Baxter can be taught to perform multiple, more complicated tasks. Sawyer was added in for smaller, more precise tasks. The play does not focus in detail on the technology behind the creation of these living creatures, but in their appearance they prefigure modern ideas of androids , creatures who can be mistaken for humans. These mass-produced workers are depicted as efficient but emotionless, incapable of original thinking and indifferent to self-preservation. At issue is whether the robots are being exploited and the consequences of human dependence upon commodified labor especially after a number of specially-formulated robots achieve self-awareness and incite robots all around the world to rise up against the humans. However, he did not like the word, and sought advice from his brother Josef, who suggested "roboti". Robot is cognate with the German root Arbeit work. Asimov created the " Three Laws of Robotics " which are a recurring theme in his books. These have since been used by many others to define laws used in fiction. The three laws are pure fiction, and no technology yet created has the ability to understand or follow them, and in fact most robots serve military purposes, which run quite contrary to the first law and often the third law. If you read the short stories, every single one is about a failure, and they are totally impractical," said Dr. Joanna Bryson of the University of Bath. Mobile robot and Automated guided vehicle Mobile robots [76] have the capability to move around in their environment and are not fixed to one physical location. An example of a mobile robot that is in common use today is the automated guided vehicle or automatic guided vehicle AGV. An AGV is a mobile robot that follows markers or wires in the floor, or uses vision or lasers. Mobile robots are also found in industry, military and security environments. Mobile robots are the focus of a great deal of current research and almost every major university has one or more labs that focus on mobile robot research. Because of this most humans rarely encounter robots. However domestic robots for cleaning and maintenance are increasingly common in and around homes in developed countries. Robots can also be found in military applications. Industrial robot and Manipulator device A pick and place robot in a factory Industrial robots usually consist of a jointed arm multi-linked manipulator and an end effector that is attached to a fixed surface. One of the most common type of end effector is a gripper assembly. Service robot Most commonly industrial robots are fixed robotic arms and manipulators used primarily for production and distribution of goods. The term "service robot" is less well-defined. The International Federation of Robotics has proposed a tentative definition, "A service robot is a robot which operates semi- or fully autonomously to perform services useful to the well-being of humans and equipment, excluding manufacturing operations. Educational robotics Robots are used as educational assistants to teachers. From the s, robots such as turtles were used in schools and programmed using the Logo language. Robotics have also been introduced into the lives of elementary and high school students in the form of robot competitions with the company FIRST For Inspiration and Recognition of Science and Technology. Modular robot Main article: Self-reconfiguring modular robot Modular robots are a new breed of robots that are designed to increase the utilization of robots by modularizing their architecture. These robots are composed of a single type of identical, several different identical module types, or similarly shaped modules, which vary in size. Their architectural structure allows hyper-redundancy for modular robots, as they can be designed with more than 8 degrees of freedom DOF. Creating the programming, inverse kinematics and dynamics for modular robots is more complex than with traditional robots. Modular robots may be composed of L-shaped modules, cubic modules, and U and H-shaped modules. These "ANAT robots" can be designed with "n" DOF as each module is a complete motorized robotic system that folds relatively to the modules connected before and after it in its chain, and therefore a single module allows one degree of freedom. The more modules that are connected to one another, the more degrees of freedom it will have. L-shaped modules can also be designed in a chain, and must become increasingly smaller as the size of the chain increases, as payloads attached to the end of the chain place a greater strain on modules that are further from the base. ANAT H-shaped modules do not suffer from this problem, as their design allows a modular robot to distribute pressure and impacts evenly amongst other attached modules, and therefore payload-carrying capacity does not decrease as the length of the arm increases. Modular robots can be manually or self-reconfigured to form a different robot, that may perform different applications. Because modular robots of the same architecture type are composed of modules that compose different modular robots, a snake-arm robot can combine with another to form a dual or quadra-arm robot, or can split into several mobile robots, and mobile robots can split into multiple smaller ones, or combine with others into a larger or different one. This allows a single modular robot the ability to be fully specialized in a single task, as well as the capacity to be specialized to perform multiple different tasks. Modular robotic technology is currently being applied in hybrid transportation, [84] industrial automation, [85] duct cleaning [86] and handling. Many research centres and universities have also studied this technology, and have developed prototypes. Collaborative robots A collaborative robot or cobot is a robot that can safely and effectively interact with human workers while performing simple industrial tasks. However, end-effectors and other environmental conditions may create hazards, and as such risk assessments should be done before using any industrial motion-control application. Intended for sale to small businesses, they are promoted as the robotic analogue of the personal computer. Autonomy and ethical questions Main articles: He calls this " the Singularity ". In , experts attended a conference hosted by the Association for the Advancement of Artificial Intelligence AAAI to discuss whether computers and robots might be able to acquire any autonomy, and how much these abilities might pose a threat or hazard. They noted that some robots have acquired various forms of semi-autonomy, including being able to find power sources on their own and being able to independently choose targets to attack with weapons. They also noted that some computer viruses can evade elimination and have achieved "cockroach intelligence. Researchers at the Rensselaer Polytechnic Institute AI and Reasoning Lab in New York conducted an experiment where a robot became aware of itself, and corrected its answer to a question once it had realised this. However, other experts question this. He believes this represents an important and dangerous trend in which humans are handing over important decisions to machines. Technological unemployment For centuries, people have predicted that machines would make workers obsolete and increase unemployment , although the causes of unemployment are usually thought to be due to social policy. At present the company uses ten thousand robots but will increase them to a million robots over a three-year period. Delaney said "Robots are taking human jobs. List of robots At present, there are two main types of robots, based on their use: Robots can be classified by their specificity of purpose. A robot might be designed to perform one particular task extremely well, or a range of tasks less well. All robots by their nature can be re-programmed to behave differently, but some are limited by their physical form. For example, a factory robot arm can perform jobs such as cutting, welding, gluing, or acting as a fairground ride, while a pick-and-place robot can only populate printed circuit boards. General-purpose autonomous robots Main article: Autonomous robot General-purpose autonomous robots can perform a variety of functions independently. General-purpose autonomous robots typically can navigate independently in known spaces, handle their own re-charging needs, interface with electronic doors and elevators and perform other basic tasks. Like computers, general-purpose robots can link with networks, software and accessories that increase their usefulness. They may recognize people or objects, talk, provide companionship, monitor environmental quality, respond to alarms, pick up supplies and perform other useful tasks. General-purpose robots may perform a variety of functions simultaneously or they may take on different roles at different times of day. Some such robots try to mimic human beings and may even resemble people in appearance; this type of robot is called a humanoid robot. Humanoid robots are still in a very limited stage, as no humanoid robot can, as of yet, actually navigate around a room that it has never been in. Factory robots Car production Over the last three decades, automobile factories have become dominated by robots. A typical factory contains hundreds of industrial robots working on fully automated production lines, with one robot for every ten human workers. On an automated production line, a vehicle chassis on a conveyor is welded , glued , painted and finally assembled at a sequence of robot stations. Packaging Industrial robots are also used extensively for palletizing and packaging of manufactured goods, for example for rapidly taking drink cartons from the end of a conveyor belt and placing them into boxes, or for loading and unloading machining centers. Electronics Mass-produced printed circuit boards PCBs are almost exclusively manufactured by pick-and-place robots, typically with SCARA manipulators, which remove tiny electronic components from strips or trays, and place them on to PCBs with great accuracy. Mobile robots, following markers or wires in the floor, or using vision [] or lasers, are used to transport goods around large facilities, such as warehouses, container ports, or hospitals. Very little feedback or intelligence was required, and the robots needed only the most basic exteroceptors sensors. The limitations of these AGVs are that their paths are not easily altered and they cannot alter their paths if obstacles block them. If one AGV breaks down, it may stop the entire operation.

4: Robot - Wikipedia

Robots Getting a Grip on General Manipulation How a new generation of grippers with improved 3D perception and tactile sensing is learning to manipulate a wide variety of objects.

Rolling robots[edit] Segway in the Robot museum in Nagoya For simplicity, most mobile robots have four wheels or a number of continuous tracks. Some researchers have tried to create more complex wheeled robots with only one or two wheels. These can have certain advantages such as greater efficiency and reduced parts, as well as allowing a robot to navigate in confined places that a four-wheeled robot would not be able to. Two-wheeled balancing robots[edit] Balancing robots generally use a gyroscope to detect how much a robot is falling and then drive the wheels proportionally in the same direction, to counterbalance the fall at hundreds of times per second, based on the dynamics of an inverted pendulum. Self-balancing unicycle A one-wheeled balancing robot is an extension of a two-wheeled balancing robot so that it can move in any 2D direction using a round ball as its only wheel. Spherical robot Several attempts have been made in robots that are completely inside a spherical ball, either by spinning a weight inside the ball, [68] [69] or by rotating the outer shells of the sphere. Tracked wheels behave as if they were made of hundreds of wheels, therefore are very common for outdoor and military robots, where the robot must drive on very rough terrain. However, they are difficult to use indoors such as on carpets and smooth floors. Several robots have been made which can walk reliably on two legs, however, none have yet been made which are as robust as a human. Typically, robots on two legs can walk well on flat floors and can occasionally walk up stairs. None can walk over rocky, uneven terrain. Some of the methods which have been tried are: In this way, the two forces cancel out, leaving no moment force causing the robot to rotate and fall over. However, it still requires a smooth surface to walk on. Initially, a robot with only one leg, and a very small foot could stay upright simply by hopping. The movement is the same as that of a person on a pogo stick. As the robot falls to one side, it would jump slightly in that direction, in order to catch itself. A bipedal robot was demonstrated running and even performing somersaults. Passive dynamics Perhaps the most promising approach utilizes passive dynamics where the momentum of swinging limbs is used for greater efficiency. It has been shown that totally unpowered humanoid mechanisms can walk down a gentle slope, using only gravity to propel themselves. Using this technique, a robot need only supply a small amount of motor power to walk along a flat surface or a little more to walk up a hill. Left one has 64 motors with 2 degrees of freedom per segment , the right one A modern passenger airliner is essentially a flying robot, with two humans to manage it. The autopilot can control the plane for each stage of the journey, including takeoff, normal flight, and even landing. They can be smaller and lighter without a human pilot on board, and fly into dangerous territory for military surveillance missions. Some can even fire on targets under command. UAVs are also being developed which can fire on targets automatically, without the need for a command from a human. Other flying robots include cruise missiles , the Entomopter, and the Epson micro helicopter robot. Robots such as the Air Penguin, Air Ray, and Air Jelly have lighter-than-air bodies, propelled by paddles, and guided by sonar. Snaking[edit] Several snake robots have been successfully developed. Mimicking the way real snakes move, these robots can navigate very confined spaces, meaning they may one day be used to search for people trapped in collapsed buildings. It has four legs, with unpowered wheels, which can either step or roll. One approach mimics the movements of a human climber on a wall with protrusions; adjusting the center of mass and moving each limb in turn to gain leverage. An example of this is Capuchin, [98] built by Dr. Ruixiang Zhang at Stanford University, California. Another approach uses the specialized toe pad method of wall-climbing geckoes , which can run on smooth surfaces such as vertical glass. Examples of this approach include Wallbot [99] and Stickybot. Li, the gecko robot could rapidly climb up and down a variety of building walls, navigate through ground and wall fissures, and walk upside-down on the ceiling. It was also able to adapt to the surfaces of smooth glass, rough, sticky or dusty walls as well as various types of metallic materials. It could also identify and circumvent obstacles automatically. Its flexibility and speed were comparable to a natural gecko. A third approach is to mimic the motion of a snake climbing a pole. Therefore, many researchers studying underwater robots would like to copy this type of locomotion.

Festo have also built the Aqua Ray and Aqua Jelly, which emulate the locomotion of manta ray, and jellyfish, respectively. Huosheng Hu at Essex University. Since the propulsion of sailboat robots uses the wind, the energy of the batteries is only used for the computer, for the communication and for the actuators to tune the rudder and the sail. If the robot is equipped with solar panels, the robot could theoretically navigate forever. Environmental interaction and navigation[edit].

5: Multi-Robot Control System - SMP Robotics - Autonomous mobile robot

Robot Manipulation is the basic science in Robotics. Most of the modern theories arise from the classical concepts of robot manipulation. Slideshare uses cookies to improve functionality and performance, and to provide you with relevant advertising.

 Abstract Multifingered robots play an important role in manipulation applications. They can grasp various shaped objects to perform point-to-point movement. It is important to plan the motion path of the object and appropriately control the grasping forces for multifingered robot manipulation. In this paper, we perform the optimal grasping control to find both optimal motion path of the object and minimum grasping forces in the manipulation. The rigid body dynamics of the object and the grasping forces subjected to the second-order cone SOC constraints are considered in optimal control problem. The minimum principle is applied to obtain the system equalities and the SOC complementarity problems. Since the FB function is semismooth, the semismooth Newton method with the generalized Jacobian of FB function is used to solve the nonlinear equations. The 2D and 3D simulations of grasping manipulation are performed to demonstrate the effectiveness of the proposed approach. Introduction Multifingered robots have attracted much attention in robotics manipulation applications. They can grasp various shaped objects and dexterously perform point-to-point manipulations. Many researches [1 â€” 6] have been proposed for grasping and manipulating objects with multifingered robots. Miller and Allen [2] proposed a user interface with grasp quality evaluation for the robot hand design. Xu and Li [5] proposed a modeling method for the manipulation involving finger gaits. It is important to appropriately control the grasping forces for multifingered robot manipulation. Since the grasping manipulation utilizes the contact and friction forces to hold and move an object, the grasping forces should satisfy the point-contact friction constraint and be equal to the dynamic wrench of the grasped object. It is required to find the minimum forces for moving the grasped object in the manipulation. Boyd and Wegbreit [7] used the semidefinite programming and second-order cone programming to efficiently find the grasping forces. Because the external wrench of the object varies with the manipulation path and orientation of the object, it is important to plan a manipulation trajectory [13] for achieving the minimum grasping forces. In this paper, we perform the optimal grasping control to find both optimal manipulation path of the object and minimum grasping forces. The rigid body dynamics of the object and the grasping forces subjected to the second-order cone SOC constraints are considered in the grasping control problem. The minimum principle [14] is applied to obtain the system equalities and the SOC complementarity problems. The semismooth Newton method with the generalized Jacobian of FB function is then used to solve the equations. Finally, simulations of optimal grasping manipulation are performed to demonstrate the effectiveness of the proposed approach. The remainder of this paper is organized as follows: Section 2 describes the optimal grasping control problem. In Section 3 , the semismooth Newton method with the generalized Jacobian of Fischer-Burmeister function is addressed. Section 4 presents the simulation results of 2D and 3D grasping manipulations. Finally, concluding remarks are given in Section 5. Optimal Grasping Control Figure 1 shows the multifingered robot grasping manipulation. The multifingered robot grasps and moves the object from the initial position to the final position. The dynamic equation of the object can be expressed with Newton-Euler equations [15 , 16] as where.

6: Robotic Manipulation: Harvard Robotics Laboratory

Robots and Emotional Manipulation by jnelson | Aug 17, | How the Net Works, News Our relationships with robots will be as complicated as our relationships with any beings possessing a certain amount of intelligence and free will.

Intera integrates algorithms that enable the robot to quickly learn new tasks and safely work alongside humans. Rethink Robotics Sawyer click images to enlarge Sawyer can take the place of a human in a tightly packed assembly line and perform functions like machine tending, material handling, and circuit board testing, which are difficult or impossible for the larger, less adept Baxter. Then Baxter can take over at the other end of the line to move the products. The change was made in order to keep the robot small and light, said Benoit. The tether does not significantly impact latency, he adds. Baxter, on the other hand, is fully documented. The PC does not need to be connected during standard operation. Yet, Sawyer can support a 4 k 8. Unlike Baxter, Sawyer is IPprotected protected against dust and spray. The robot also features an informational display, which features the animated face. In addition, manual controls are embedded in the arm. Sawyer gripper and elbow click images to enlarge Like Baxter, Sawyer has a wide-view camera in its head. In the future, it will support more advanced features such as barcode scanning and object recognition, says the company. The robot arm has a 1-meter reach, and features 7 degrees of freedom. The arm is also said to feature Harmonic Drives in each joint to greatly reduce backlash, further adding to precision and durability. A research version will follow, said Benoit. Brooks told IEEE Spectrum that the chief market will be Chinese electronics assembly and testing facilities, which are seeing rising labor costs and high turnover. Fetch essentially has the same core crew and leadership as the now defunct Willow Garage spinoff Unbounded Robotics. The new Fetch bots are expected to be somewhat similar in price and functionality. The videos below were posted to YouTube by Baxter. More information may be found at the Rethink Robotics Sawyer product page.

7: Nanite Manipulation | Superpower Wiki | FANDOM powered by Wikia

robots, to grasping and manipulation of objects by multiï¬•ngered robot hands, to nonholonomic motion planningâ€”represents an evolution from the more basic concepts to the frontiers of the research in the ï¬•eld.

8: Robotic Manipulation | the Neuroscience and Robotics Laboratory

The power to manipulate tiny, nanoscopic robotic metal machines. Variation of Robotic Manipulation. Technological counterpart of Organite Manipulation. The user can create, shape and manipulate nanites, machines or robots whose components are at or near the scale of a nanometre.

9: Optimal Grasping Manipulation for Multifingered Robots Using Semismooth Newton Method

Remote control fighting robots is the perfect robotic toy gift for boys IHBUDS Remote Control Toy Robot for Kids,Touch & Sound Control, Speaks, Dance Moves, Plays Music. Built-in Coin Bank.

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