SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

20 March – 21 May 2021

TOPICAL REPORT

ROBOTICS & AUTOMATION

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news

AUTOMATION

ABB Robotics Advances Construction Industry Automation to Enable Safer and Sustainable Building

"Robotic automation offers huge potential to enhance productivity, efficiency and manufacturing flexibility throughout the construction industry, including automating the fabrication of modular homes and building components off-site, robotic welding and material handling on building sites and robot 3D printing of houses and customized structures. As well as making the industry safer and more cost effective, robots are improving sustainability and reducing environmental impact by enhancing quality and cutting waste."
Source: Automation,com

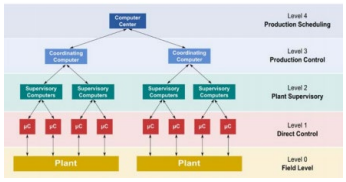
Advances in Conveyance Technology

"An assortment of flexible conveyance options available on the market today can allow manufacturers to more precisely position products, achieve energy efficiency gains, and improve overall equipment effectiveness."
Source: Automation World

Open Secure Remote Operations: A Vision Fulfilled

academic

AUTOMATION



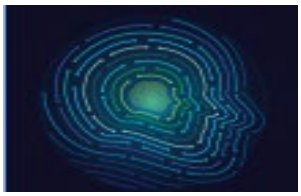
Research on Real-time Data Acquisition Technology Based on Distribution Automation Technology

"The remote terminal equipment data collection system of distribution automation plays a decisive role in the monitoring of distribution networks. The thesis studies the key technologies of distribution network operation and real-time data collection of topology data, analyses various new technologies of ICT, designs the basic technical architecture of real-time data collection, and realizes the automatic connection of various professional data of distribution networks such as equipment, marketing, and scheduling. Into a unified distribution network database that integrates various disciplines, multiple themes, and multiple applications, comprehensively improves the quality of distribution network data, and provides a basis for distribution network diagnosis and big data analysis."
Source: IOP Science

Future Industrial Networks in Process Automation: Goals, Challenges, and Future Directions

reports

AUTOMATION



Automation with intelligence: Pursuing organisation wide re-imagination

"Humans have always been afraid of the unknown. And yet, even as children, our curiosity inexplicably compels us to explore further afield or to reimagine our own bright but small worlds. Our preoccupation with the unknown has changed: The folklore of the Brothers Grimm gave way to authors and poets like William Blake and Mary Shelley, who gave way to the ubiquity of 20th-century science fiction. But even as nature gave way to technology, the act of creation has remained central to the unknown. Humans imagining and reimagining."
Source: Deloitte

What more than 32,000 people think about the future of work

- "Almost 40% of workers think their job will be obsolete within five years, according to PwC's Hopes and fears 2021 report.
- Six in 10 are concerned about machines taking over their jobs.
- Humans and machines are predicted to spend an equal amount of time on tasks at work by 2025, according to the World Economic Forum."

Source: World Economic Forum

"For some time now, automation vendors have been promoting anytime, anywhere access to your process data, but delivering on the promise has been technically and commercially challenging to scale. Now that this actually is within reach, you may be suspect. But do not be deterred, as the future is now with open and secure Industrial Internet of Things (IIoT) solutions finally available."
Source: Automation,com

Building robots to expand access to cell therapies

"Over the last two years, Multiply Labs has helped pharmaceutical companies produce biologic drugs with its robotic manufacturing platform. The robots can work around the clock, precisely formulating small batches of drugs to help companies run clinical trials more quickly.
Now Multiply Labs, which was founded by Fred Parietti PhD '16 and former visiting PhD at MIT Alice Melocchi, is hoping to bring the speed and precision of its robots to a new type of advanced treatment."
Source: MIT News

AUTONOMOUS VEHICLES

The autonomous vehicle world is shrinking — it's overdue

"After years of positive vibes about the future of autonomous vehicles and nearly unrestricted access to cash from Kool-Aid-drunk venture capitalists, the AV industry is confronting some hard truths. The first is that autonomous vehicles are going to take a lot longer to reach mass scale than previously thought. The second is that it's going to be a lot more expensive, too. And the third hard truth: going it alone is no longer a viable option."
Source: The Verge

The environmental trade-offs of autonomous vehicles

"Optimistic predictions expect reliable autonomous vehicles to be commercially available by 2030, at a time when mobility is undergoing a profound shift away from traditional modes of transportation and towards door-to-door services. Previous analysis suggested that public transport will lose market share to autonomous vehicles, but the environmental impact of changing transport use has hardly been considered. New research shows that the convenience of autonomous

"There are many initiatives and technologies working towards implementing factories of the future. One consensus is that the classical hierarchical automation system design needs to be flattened while supporting the functionality of both Operation Technology (OT) and Information Technology (IT) within the same network infrastructure... To address the challenges, in this paper, we describe one desired future scenario for process automation and carry out traffic measurements from a pulp and paper mill. The measured traffic is further analyzed, which reveals representative traffic characteristics in the process automation."
Source: MDPI

Automation of Pan-Sharpening Methods for Pléiades Images Using GIS Basic Functions

"Pan-sharpening methods allow the transfer of higher resolution panchromatic images to multispectral ones concerning the same scene. Different approaches are available in the literature, and only a part of these approaches is included in remote sensing software for automatic application… This paper aims to explain the approach implemented in Quantum GIS (QGIS) for automatic pan-sharpening of Pléiades images. The experiments are carried out on data concerning the Greek island named Lesbo. In total, 14 different pan-sharpening methods are applied to reduce pixel dimensions of the four multispectral bands from 2 m to 0.5 m. The automatic procedure involves basic functions already included in GIS software; it also permits the evaluation of the quality of the resulting images supplying the values of appropriate indices."
Source: MDPI

The digital revolution and the labour economics of automation: A review

"This paper reviews the economic literature about the effects of the digital revolution on the labour market, and provides a non-technical introduction to the labour economics of automation. It conceptualizes the digital revolution and describes how recent technological trends, such as robotics, industry 4.0, artificial intelligence and the platform economy, affect specific occupations. It reviews the main economic theories and the empirical evidence of how automation affects labour demand, the occupational structure and the work task composition of occupations."
Source: Robonomics

INDUSTRY OUTLOOK

Association for Advancing Automation report shows growth in Q1 robot orders

"According to a new report issued by the Association for Advancing Automation (A3), total robot orders in Q1 2021 were up over 20% compared to Q1 2020. Companies in the metal industry increased orders in this time period by 86%, while life sciences, pharmaceutical, and biomed companies increased orders by 72%."
Source: Vision Systems Design

Global Mobile Robotics Market (2021 to 2029) - Key Industry Trends and Future Outlook

"This report offers strategic insights into the global mobile robotics industry along with the market size and estimates for the duration 2019 to 2029. The said research study covers in-depth analysis of multiple market segments based on product types, applications and cross-sectional study across different geographies and sub-geographical segments. The study covers the comparative analysis of different segments for the years 2020 & 2029. The report also provides a prolific view on market dynamics such as market drivers, restraints and opportunities."
Source: Intrado Globe Newswire

Top 5 Countries Leading Robotics Implementation In 2021

"The proliferation of robotics has well begun. These automated machines are employing aside human workers and performing complex tasks at a shared workplace. Reports indicate that robotics implementation across countries is high. As per the data from the International Federation of Robotics (IFR), the pace of industrial automation is expediting across the developed world with 74 installed industrial robots for every 10,000 employees globally in 2016. The number by 2020 reached 113 across the manufacturing sector."
Source: Analytics Insight

Robotics Market Size is Estimated to Grow at CAGR of 4.5% During 2021-2025 with Top Countries Data

"According to 360 Research Reports, the "Robotics Market" 2021 by Types (Industrial Robots, Service Robots for

vehicles would likely come at an environmental cost."
Source: IOP Publishing

Self-driving vehicles to become legal in UK in 2021

"The Department for Transport (DfT) has set out the parameters within which automatic lane-keeping systems (ALKS) must operate to allow a driver to legally take his attention from the road and perform a completely different, non-driving-related task while at the wheel – classed as Level 3 automation.
Currently, several high-end automobile models already include lane-keeping assistance technology (Tesla's AutoPilot technology being a well-known example of this kind of system), however they require a driver to sit with his hands hovering over the wheel, ready to take over at a split second's notice, should he spot a potentially dangerous situation – because, legally, the driver is always fully responsible for the vehicle (Level 2 automation)."
Source: Traffic Technology Today

A Fatal Crash Renews Concerns Over Tesla's 'Autopilot' Claim

"TESLA OFFERS A $10,000 feature called Full Self-Driving Capability. It includes futuristic goodies like the ability to summon the car via app in a parking lot, and it can detect and react to traffic lights and stop signs. FSD, as Tesla enthusiasts call it, includes Autopilot, a feature that "automatically" drives on highways, changing lanes, keeping a car within its lane and at a consistent distance from other vehicles."
Source: Wired

The autonomous vehicle world is shrinking — it's overdue

"After years of positive vibes about the future of autonomous vehicles and nearly unrestricted access to cash from Kool-Aid-drunk venture capitalists, the AV industry is confronting some hard truths. The first is that autonomous vehicles are going to take a lot longer to reach mass scale than previously thought. The second is that it's going to be a lot more expensive, too. And the third hard truth: going it alone is no longer a viable option."
Source: The Verge

Why smart roads are just as important as autonomous vehicles

"There's no doubt that self-driving cars, or autonomous vehicles (AVs), are much safer than the average person-manned vehicle. In fact, more than 90% of serious crashes are due to

Developing Automation Adoption Readiness Index for Quality Management Focused on Highway Construction

"This study identifies the critical readiness indicators of construction automation adoption readiness (AAR) and proposes a process for assessing quality management (QM) AAR using a fuzzy index model. A survey was conducted among experienced highway construction professionals with knowledge of QM and automated systems within the US. Results indicate that the external indicators have the most impact on determining AAR, whereas technological indicators have the least impact."
Source: ASCE Library

Mathematical Modeling of the Manufacturing Sector's Dominant Part as a Base for Automation

"The current great expansion of automation and robotics affects a multiplicity of various fields. A prominent example is industry, where the different manufacturing processes and technologies embrace a certain level of automation and robotics. Thus, the use of robotics and automation implementation is part of a rapidly rising trend in industry. The presented paper deals with the manufacturing segment in the context of automation. The main subject is data analysis, with our own subsequent model building and final realization of the prediction corresponding to the machinery and electrical machinery sector as a highly relevant automation driver through the use of mathematical modeling."
Source: MDPI

AUTONOMOUS VEHICLES

Adaptive governance of autonomous vehicles: Accelerating the adoption of disruptive technologies in Singapore

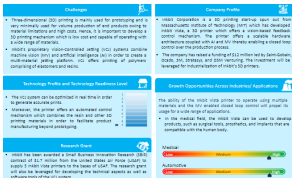
"Despite their promise, there have been discussions surrounding the technological risks of autonomous vehicles (AVs) and the extent to which AVs are ready for large-scale deployment. Using a case study approach, this article examines the development and implementation of AVs in Singapore. Our findings reveal

Professional, Service Robots for Personnel), Application (Military, Industrial, Commercial, Personal) and Region - Global Forecast to 2025", is anticipated to rise at a considerable rate during the forecast period, between 2020 and 2025. This report is comprehensive statistical analysis of the Robotics with Market data. Tables and Figures which spread through 136 Pages and in-depth TOC on Robotics Market that provides data for making strategies to increase the market growth and success."
Source: Market Watch

Worldwide Robotic Process Automation Industry (2021 to 2026)

"Robotic Process Automation refers to the process of automating the tedious and repetitive tasks in an organization through the use of robots. According to UiPath, a global software company that develops platform for Robotic Process Automation, RPA can be defined as "A technology that allows anyone today to configure computer software, or a 'robot' to emulate and integrate the actions of a human interacting within digital systems to execute a business process." The adoption of emerging technologies like RPA to automate the mundane, rule based repetitive tasks has resulted in accelerated work, reduced human error, and increased output. Combining RPA with advanced cognitive technologies like artificial intelligence (AI), machine learning (ML) and natural language processing (NLP) etc. will allow organisations to automate even those tasks which generally require human decision making capabilities."
Source: Business Wire

INDUSTRY REPORT



Growth Opportunities In Robotics, Digital Twins, And Industrial Automation

"The Advanced Manufacturing Technology Opportunity Engine for April 2021 covers innovations in collaborative robots, metal 3D printing, and remote monitoring in manufacturing. Some of the profiles include artificial intelligence-based cobots and automatic tool changer cobots, SLM, and PBF advancements in metal 3D printing, remote monitoring, and maintenance in manufacturing and warehouse robots."
Source: Frost & Sullivan

human error, which means autonomous vehicles have the potential to significantly reduce the number of collisions and save lives.
However, there are still plenty of obstacles the technology of AVs has yet to address, including seeing objects behind occlusions like buses or trucks, detecting and anticipating the movements of pedestrians and drivers well ahead of time, and dealing with defective or dirty car sensors. Another complication AV technology has yet to fully evolve is the ability to react appropriately when new and unusual road circumstances arise."
Source: Traffic Technology Today

World's longest indoor autonomous vehicle test track now open

"AstaZero has customers across the globe. The industry has been asking for a long indoor track in Sweden for many years. And when the pandemic hit and the subsequent restrictions made it difficult for the industry to conduct important tests, the need only became greater, which is when plans for the new track accelerated.
"AstaZero's facility provides a wide range of infrastructure that is important for the testing and validation of our technologies in safety, autonomous driving and connectivity, making it possible for us to perform testing in well-controlled environments all year round," says Mats Moberg, senior vice president of R&D at Volvo Cars."
Source: Traffic Techonology Today

ROBOTICS INDUSTRY

Red Dot Design Award for Stäubli SCARA robots

"The new TS2 SCARA series from Stäubli is not only well received by the industry, now the innovative four-axis robots have won one of the most coveted design awards, the Red Dot Design Award 2021 in the "Product Design" category."
Source: International Federation of Robotics

US Robot Density in Car Industry Ranks 7th Worldwide

"The robot density in the US automotive industry hit a new record of 1,287 installed units per 10,000 employees. The United States ranks seventh worldwide. The density is similar to Germany (1,311 units) and Japan (1,248 units). China is in twelfth place with 938 units."
Source: International Federation of Robotics

that AV regulatory sandboxes, the formalisation of safety assessments and the release of technical guidelines are some of the most adaptive and innovative instruments that have been adopted to govern AVs in Singapore. Furthermore, Singapore's approach to AVs has applied an adaptive strategy that is both pre-emptive and responsive."
Source: Elsevier

Autonomous vehicles effects on public transport systems

"Nowadays cities are subjected to an urbanization increase, such phenomena has several consequences that affect different topics but especially regard urban mobility, because of this increase the number of people using cars rises consequently congestion and CO2 emissions increase. The rise of private vehicles circulating creates a decrease of average speed travel that affect the entire city context so its liveability, then when a high number of vehicles moves into infrastructure that was not designed for that capacity probability of collision will increase due to the elevated interaction compromising people safety. For this reasons public transport systems represents a key role in the liveability of a city because most of them operates in reserved areas and moreover decrease the number of private vehicles moving in cities."
Source: AIP Conference Proceedings

Evaluating driver eye glance behavior and secondary task engagement while using driving automation systems

"The results of this study demonstrate that drivers spent more time looking away from the road while driving automation systems were active and that drivers were more likely to be observed browsing on their cell phones while using driving automation systems. Current driving automation features require human monitoring of automation, yet the drivers of these automation-equipped vehicles are inclined to engage in secondary tasks and take longer and more frequent glances away from the roadway."
Source: Elsevier

Can autonomous vehicles enable sustainable mobility in future cities? Insights and policy challenges from user preferences over different urban transport options

"Creating sustainable urban futures partly requires reducing car-use and transport induced stresses on the environment and society. New

Growth Opportunities In Robots, 3d Printing,3d Vision Systems, And Digital Twin

"The Advanced Manufacturing Technology Opportunity Engine for May 2021 covers innovations in robotics, 3D printing, vision systems, and digital twin. Some of the innovations include robotics for object detection using radio frequency, 3D printing, welding robots, construction robots, AI powered analytics for manufacturing, and digital twin for transportation visualization."
Source: Frost & Sullivan

Demand for delivery robots has 'quadrupled' in past year, says Starship Technologies

"Starship Technologies operates commercially on a daily basis around the world. Its zero-emission robots have made more than 1.5 million autonomous deliveries, more than any other autonomous delivery company in the world, travelled millions of miles and make more than 80,000 road crossings every day. The company has raised $102 million in funding to date."
Source: Robotics and Automation News

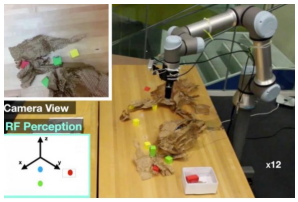
InOrbit launches 'Time Capsule' to provide greater insights into robot fleets

"InOrbit, a provider of cloud-based software to help operations teams orchestrate service robots, has launched a new service called "Time Capsule", which gives engineering and operations staff greater insights into their robot fleets."
Source: Robotics and Automation News

Advanced Robotics for Manufacturing (ARM) Institute Announces Availability of RoboticsCareer.Org

"The ARM Institute is the nation's leading collaborative in robotics and workforce innovation, working at the confluence of industry, government, and academia. Structured as a public-private partnership, the ARM Institute and its member organizations catalyze robotic technologies and education solutions to strengthen the U.S. industrial base and secure U.S. manufacturing resiliency. The institute is sponsored by the DoD, and its diverse membership base includes start-ups, robotics suppliers, research universities, community colleges, manufacturers of all sizes, unions, government agencies, workforce development organizations and more."
Source: Automation.com

ROBOTICS DESIGNS



A robot that senses hidden objects

"In recent years, robots have gained artificial vision, touch, and even smell. "Researchers have been giving robots human-like perception," says MIT Associate Professor Fadel Adib."
Source: Robotics and Automation News

transport technologies such as autonomous vehicles are increasingly assuming prominence in debates about the transition toward sustainable urban futures. Yet, enormous uncertainties currently exist on how autonomous vehicles might shape urban mobility. To address this gap, this paper examines the latent behavioural and socio-demographic factors that will drive the adoption of and preferences for different use options of autonomous vehicles, utilizing survey data from Dublin, Republic of Ireland."
Source: Elsevier

Users, planners, and governments perspectives: A public survey on autonomous vehicles future advancements

"Autonomous vehicles (AVs) are expected to change driving perspectives once they are available in the markets. This type of vehicle has received substantial attention lately from media and researchers. This technology is still under rapid advancements, and further research studies are needed to address the potential outcomes, opportunities, and challenges. The fuel system of the AVs is expected to be electrical; therefore, this study addresses the current status of electric vehicles (EVs), including charging time, charging type, and driving range. The study also discusses the barriers that may hindrance the transformation to AVs from the users, planners, and government perspectives."
Source: Elsevier

The benefits of autonomous vehicles for community-based trip sharing

"This work reconsiders the concept of community-based trip sharing proposed by Hasan et al. (2018) that leverages the structure of commuting patterns and urban communities to optimize trip sharing. It aims at quantifying the benefits of autonomous vehicles for community-based trip sharing, compared to a car-pooling platform where vehicles are driven by their owners. In the considered problem, each rider specifies a desired arrival time for her inbound trip (commuting to work) and a departure time for her outbound trip (commuting back home)."
Source: Elsevier

ROBOTICS

A robot that can help you untangle your hair

"Hair-combing bots, however, proved to be less explored, leading scientists from MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) and the Soft Math Lab at Harvard University to develop a robotic arm setup with a sensorized soft brush. The robot is equipped with a camera that helps it "see" and assess curliness, so it can plan a delicate and time-efficient brush-out."
Source: MIT News

Agility Robotics' Cassie Is Now Astonishingly Good at Stairs

"Stairs have been a challenge for robots of all kinds (bipeds, quadrupeds, tracked robots, you name it) since, well, forever. And usually, when we see bipeds going up or down stairs nowadays, it involves a lot of sensing, a lot of computation, and then a fairly brittle attempt that all too often ends in tears for whoever has to put that poor biped back together again."
Source: IEEE Spectrum

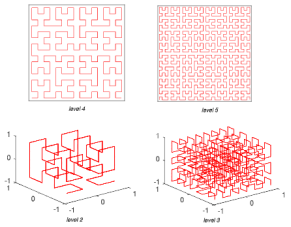
Sense of Touch Improves Control of Robotic Arm

"In a paper published today in *Science*, a team of bioengineers from the University of Pittsburgh Rehab Neural Engineering Labs describe how adding brain stimulation that evokes tactile sensations makes it easier for the operator to manipulate a brain-controlled robotic arm. In the experiment, supplementing vision with artificial tactile perception cut the time spent grasping and transferring objects in half, from a median time of 20.9 to 10.2 seconds."
Source: University of Pittsburgh

Robotic 'Third Thumb' use can alter brain representation of the hand

"Designer Dani Clode began developing the device, called the Third Thumb, as part of an award-winning graduate project at the Royal College of Art, seeking to reframe the way we view prosthetics, from replacing a lost function, to an extension of the human body. She was later invited to join Professor Tamar Makin's team of neuroscientists at UCL who were investigating how the brain can adapt to body augmentation."
Source: University College London

ROBOTICS RESEARCH



Space-filling curves for numerical approximation and visualization of solutions to systems of nonlinear inequalities with applications in robotics

"The problem of approximating and visualizing the solution set of systems of nonlinear inequalities can be frequently met in practice, in particular, when it is required to find the working space of some robots. In this paper, a method using Peano-Hilbert space-filling curves for the dimensionality reduction has been proposed for functions satisfying the Lipschitz condition. Theoretical properties of the introduced algorithm showing advantages of this reduction in the context of the present problem have been established and convergence properties of this method have been studied."
Source: Elsevier

A New Paradigm of Threats in Robotics Behaviors

"Robots applications in our daily life increase at an unprecedented pace. As robots will soon operate "out in the wild", we must identify the safety and security vulnerabilities they will face. Robotics researchers and manufacturers focus their attention on new, cheaper, and more reliable applications. Still, they often disregard the operability in adversarial environments where a trusted or untrusted user can jeopardize or even alter the robot's task.
In this paper, we identify a new paradigm of security threats in the next generation of robots. These threats fall beyond the known hardware or network-based ones, and we must find new solutions to address them."
Source: Cornell University

What is the message of the robot medium? Considering media ecology and mobilities in critical robotics research

"This article makes the case for including frameworks of media ecology and mobilities research in the shaping of critical robotics research for a human-centered and holistic lens onto robot technologies. The two meta-disciplines, which align in their attention to relational processes of communication and movement, provide useful tools for critically

Carnegie Mellon awarded $150 million to develop robotics research facility

"Carnegie Mellon has been the global pioneer in robotics research and education since it founded the first US university department devoted to the field in 1979.

Since then, CMU researchers have regularly developed robotics breakthroughs, from robots that perform critical tasks in the harshest conditions on earth to assistive technologies that enhance the daily lives of differently abled people to advanced visualization and perception systems that will be key for the safety and reliability of autonomous vehicles.

Over the past 10 years alone, robotics research expenditures at CMU have nearly doubled, and are expected to double again over the next decade."

Source: Robotics and Automation News

SOFT ROBOTICS

Magnetically propelled cilia power climbing soft robots and microfluidic pumps

"The rhythmic motions of hair-like cilia move liquids around cells or propel the cells themselves. In nature, cilia flap independently, and mimicking these movements with artificial materials requires complex mechanisms. Now, researchers reporting in ACS Applied Materials & Interfaces have made artificial cilia that move in a wave-like fashion when a rotating magnetic field is applied, making them suitable for versatile, climbing soft robots and microfluidic devices"

Source: American Chemical Society

SERVICE ROBOTS

Building a Fleet of Autonomous Service Robots Just Got Faster, Cheaper and Leaner with Ohmni Modular Robotics Platform

"OhmniLabs, an award-winning developer of customized robotics solutions, today announced the availability of a new Ohmni Modular Robotics Platform that puts the power

exploring emerging human–robot dimensions and dynamics. Media ecology approaches human-made technologies as media that can shape the way we think, feel, and act. Relatedly, mobilities research highlights various kinds of influential movement and stillness of people, things, and ideas."

Source: Springer Link

Semi-autonomous avatar enabling unconstrained parallel conversations – seamless hybrid of WOZ and autonomous dialogue systems

"Many people are now engaged in remote conversations for a wide variety of scenes such as interviewing, counseling, and consulting, but there is a limited number of skilled experts. We propose a novel framework of parallel conversations with semi-autonomous avatars, where one operator collaborates with several remote robots or agents simultaneously. The autonomous dialogue system mostly manages the conversation, but switches to the human operator when necessary. This framework circumvents the requirement for autonomous systems to be completely perfect. Instead, we need to detect dialogue breakdown or disengagement. We present a prototype of this framework for attentive listening."

Source: Taylor and Francis Online

ROBOT SYSTEMS

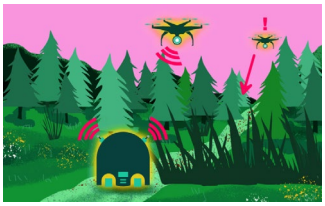
Can robots make us better humans? : virtuous robotics and the good life with artificial agents

"This position paper proposes a novel approach to the ethical design of social robots. We coin the term "Virtuous Robotics" to describe Human–Robot Interaction (HRI) designed to help humans reach a higher level of moral development. Our approach contrasts with mainstream approaches to robot design inspired by the other normative theories, Consequentialism and Deontology. In the paper we theoretically justify our proposal, illustrating how the Virtuous Robotics approach allows us to discriminate between positive and negative applications of robotics systems, of which we provide examples."

Source: Western Sydney University

of specification into the hands of its customers. With this modular robotics platform, customers can design their robots from the base to the brains - adding exterior mechanisms and functionality that make these autonomous robots perfect for tasks like disinfecting offices, hospitals and airplanes, mapping virtual tours for real estate brokers, conducting security patrol, or greeting guests in reception areas."
Source: Robotics Tomorrow

ROBOT COLLABORATIONS



Helping robots collaborate to get the job done

"Algorithm enables robot teams to complete missions, such as mapping or search-and-rescue, with minimal wasted effort."
Source: MIT News

Swarms of Robots Could Dig Underground Cities on Mars

"Underground habitats have recently become a focal point of off-planet colonization efforts. Protection from micrometeorites, radiation, and other potential hazards makes underground sites desirable compared to surface dwellings. Building such subterranean structures presents a plethora of challenges, not the least of which is how to actually construct them."
Source: Techonology.Org

SAFETY OF ROBOTS

How R2D2 is inspiring sidewalk-robot safety

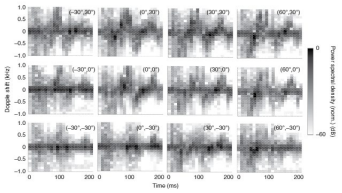
"Cities around the world are beginning to see pedestrian areas populated by a new form of automated vehicle – the sidewalk robot, used for last-mile delivery of small goods. Now transportation consultant Bern Grush is calling for the industry to focus on standards to ensure this new transportation technology is rolled out safely and efficiently."
Source: Traffic Technology Today

CHARGING SOLUTIONS

Adaptive Autonomy in Human-on-the-Loop Vision-Based Robotics Systems

"Computer vision approaches are widely used by autonomous robotic systems to sense the world around them and to guide their decision making as they perform diverse tasks such as collision avoidance, search and rescue, and object manipulation. High accuracy is critical, particularly for Human-on-the-loop (HoTL) systems where decisions are made autonomously by the system, and humans play only a supervisory role. Failures of the vision model can lead to erroneous decisions with potentially life or death consequences. In this paper, we propose a solution based upon adaptive autonomy levels, whereby the system detects loss of reliability of these models and responds by temporarily lowering its own autonomy levels and increasing engagement of the human in the decision-making process. Our solution is applicable for vision-based tasks in which humans have time to react and provide guidance."
Source: Cornell University

ROBOTICS AND AI

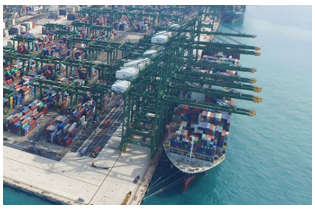


Integration of deep learning and soft robotics for a biomimetic approach to nonlinear sensing

"Here, we demonstrate this concept with a soft-robotic sensor that mimics fast non-rigid deformation of the ears in certain bat species. We show that a deep convolutional neural network can use the nonlinear Doppler shift signatures generated by these motions to estimate the direction of a sound source with an estimation error of ~0.5°. Previously, determining the direction of a sound source based on pressure receivers required either multiple frequencies or multiple receivers. Our current results demonstrate a third approach that makes do with only a single frequency and a single receiver."
Source: Nature Machine Intelligence

AI-Robotics and AI Literacy

"Ensuring the inclusion and equity of AI in education is one of the challenges that we need to solve. How can we support the urgent needs of developing countries and the underprivileged communities so that the divide between "haves" and "have-nots" will not continue to



Singapore mega-port implements Stäubli robot charging solution

"PSA Singapore's new mega-port will have fully automated key operations with AGVs that are automatically charged during the operation process with Stäubli's QCC high-power charging solution."
Source: Robotics and Automation News

ROBOTICS IN ARCHITECTURE

The future of robotics in architecture

"While modern BIM software solutions like AutoCAD and AutoCAD Architecture help streamline and improve the design process, there is also another field in which modern technologies revolutionize the field of construction.
We are talking about robotics — flexible automated systems that help solve plenty of issues and optimize the workflow across the board.
In this article, we will take a close look at how robots, AI, and automation is used in the architecture industry. We will also talk about what the future will bring to the table and why robotics is expected to become an integral part of any construction project."
Source: Robotics and Automation News

Bjarke Ingels Group and The Metals Company Design Next-Generation Robotic Mineral Collecting Facility

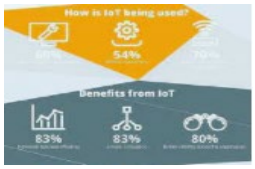
"Award-winning architecture firm Bjarke Ingels Group has collaborated with lower-impact battery metals developer The Metals Company to reimagine a traditional metal production facility in a new contemporary and sustainable context. The firm designed a circular zero-solid-waste metallurgical plant that includes manufacturing, processing, and storage facilities, along with offices, visitor centers, and innovation facilities."
Source: Arch Daily

grow? This is the core question that this project is trying to address. This paper introduces the AI-robotics project focusing on developing an open-source affordable AI-robotics tool to address the need to promote AI literacy around the world. CogBots, the AI-empowered educational learning tool, has been in development collaboratively with Google, CogLabs and UNESCO."
Source: Springer Link

Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review

"Although academic production in intelligent automation (e.g. artificial intelligence, robotics) has grown rapidly, we still lack a comprehensive understanding of the impacts of the utilization of these technologies in human resource management (HRM) at an organizational (firms) and individual (employees) level. This study therefore aims to systematize the academic inputs on intelligent automation so far and to clarify what are its main contributions to and challenges for HRM. In a systematic search of 13,136 potentially relevant studies published in the top HRM, international business (IB), general management (GM) and information management (IM) journals, we found 45 articles studying artificial intelligence, robotics and other advanced technologies within HRM settings."
Source: Taylor & Francis

INTERNET of THINGS



A Study on Internet of Things: Overview, Automation, Wireless Technology, Robotics

"Several technologies are integrated with the communication systems. Smart objects can be identified through unique id and can be tracked by its various factors. The escalation of the devices connected with the universal sensing networks for communicating creates IoT which actuates the network. For developing a common operating picture (COP) information is shared by sensors and actuators which is integrated with the environment. To create an awareness about the situation relevant information can be displayed as a single identical information. By wireless communication system technologies, the physical world and digital world will be linked in future."

Source: Annals of the Romanian Society for Cell Biology

PEDAGOGY

Robotics Education Under COVID-19 Conditions with Educational Modular Robots

"The COVID-19 pandemic forces many robotics teachers to rethink their approach to education. Distance rules and the constant threat of a partial or complete lockdown leading to limited access to classroom equipment make it challenging to plan for hands-on education where students experience robotics by experimenting and studying with robotic hardware. On the other hand, this hands-on active learning experience is one of the strengths of robotics education and the ability to handle hardware equipment a substantial learning goal of study programs on robotics. In this paper we present and discuss the approach taken for the course Robotics and Embedded Systems at Maastricht University. The course had been adjusted to meet COVID-19 safety regulations and to allow for a fast seamless transition between onsite education at university and online education where students can work with robotic hardware at home."

Source: Springer Link

Educational Robotics Curricula: Current Trends and Shortcomings

"Nowadays, Educational Robotics (ER) is flourishing at research and didactic level aiming to enhance higher-level thinking and skills. Families, schools, and educational institutes try to offer ER activities for children by utilizing various existing technologies and curricula. Despite the materials that have been created and the available technologies and curricula, it seems that not enough attention has been paid to the comprehensiveness and homogeneity of the existing curricula. The paper introduces the importance of features usually ignored in the available curricula such as icebreakers, collaboration scripts, level of learning guidance, and provision of multilingual support."

Source: Springer Link

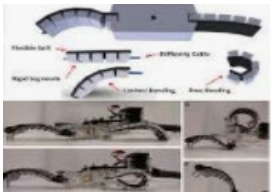
SOCIAL ROBOTICS

Three Responses to Anthropomorphism in Social Robotics: Towards a Critical, Relational, and Hermeneutic Approach

"Both designers and users of social robots tend to anthropomorphize robots. Focusing on the question how to conceptualize the relation between robots and humans, this paper first outlines two opposite philosophical views regarding this relation, which are connected to various normative responses to anthropomorphism and anthropomorphization…The paper then explores what this means for the field of social robotics and the education of computer scientists and engineers. It proposes a reform based on a relational understanding of the field itself and offers suggestions for the role of users-citizens."

Source: Springer Link

SOFT ROBOTICS

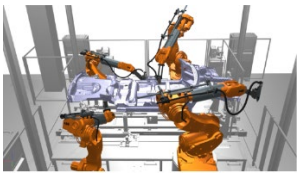


Electro-pneumatic Pumps for Soft Robotics

"Soft Robotics has applications in myriad fields from assistive wearables to autonomous exploration. Currently, the portability and performance of many devices is limited by their associated pneumatic energy source, requiring either large, heavy pressure vessels or noisy, inefficient air pumps. Here we present a lightweight, flexible, Electro-pneumatic Pump (EPP), which can silently control volume and pressure, enabling portable, local energy provision for Soft Robots, overcoming the limitations of existing pneumatic power sources. The EPP is actuated using dielectric-fluid-amplified electrostatic zipping, and the device presented here can exert pressures up to 2.34 kilopascals, deliver volumetric flow rates up to 161 millilitres per minute and under 0.5 watts of power, despite only having a thickness of 1.1 millimetres and weight of 5.3 grams."

Source: University of Bristol

INDUSTRIAL ROBOTS



Quasi-static path optimization for industrial robots with dress packs

"This paper presents a method for quasi-static path optimization for an industrial robot with respect to its deformable dress pack. Given an initial collision-free path generated by an automatic path planner, the via point configurations of the path are optimized with respect to the performance aspects of the dress pack. The method is derived from a general framework for parameter optimization of a mechanical system subject to quasi-static motions and deformations. The optimal parameter values are obtained from numerical solutions to a non-linear programming problem in which the static equilibrium equations of the system hold at discrete times."
Source: Elsevier

How can I help you? An Intelligent Virtual Assistant for Industrial Robots

"In the light of recent trends toward introducing Artificial Intelligence (AI) to enhance Human-Robot Interaction (HRI), intelligent virtual assistants (VA) driven by Natural Language Processing (NLP) receives ample attention in the manufacturing domain. However, most VAs either tightly bind with a specific robotic system or lack efficient human-robot communication. In this work, we implement a layer of interaction between the robotic system and the human operator. This interaction is achieved using a novel VA, called Max, as an intelligent and robust interface."
Source: ACM Digital Library

Fault prognosis of industrial robots in dynamic working regimes: Find degradation in variations

"This paper presents a methodology of fault prognosis of industrial robots, including (1) a modeling approach of remaining useful life prediction using domain-generalization-adversarial long short-term memory to reduce the robot-to-robot variations, (2) an approach of two-stage health assessment based on principal component analysis-squared prediction error and p-chart that can reduce the disturbance of outliers in normal operations, and (3) a workflow containing feature extraction using wavelet packet decomposition, feature smoothing using exponential

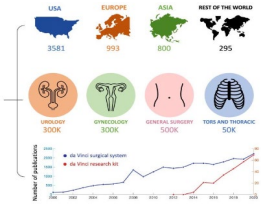
smoothing, feature normalization using z-score and feature selection using Pearson correlation coefficient."
Source: Elsevier

ROBOTICS APPLICATIONS

Real-Time Ellipse Detection for Robotics Applications

"We propose a new algorithm for real-time detection and tracking of elliptic patterns suitable for real-world robotics applications. The method fits ellipses to each contour in the image frame and rejects ellipses that do not yield a good fit. It can detect complete, partial, and imperfect ellipses in extreme weather and lighting conditions and is lightweight enough to be used on robots' resource-limited onboard computers. The method is used on an example application of autonomous UAV landing on a fast-moving vehicle to show its performance indoors, outdoors, and in simulation on a real-world robotics task. The comparison with other well-known ellipse detection methods shows that our proposed algorithm outperforms other methods with the F1 score of 0.981 on a dataset with over 1500 frames. The videos of experiments, the source codes, and the collected dataset are provided with the paper."
Source: Cornell University

ROBOTICS IN HEALTHCARE



Accelerating Surgical Robotics Research: Reviewing 10 Years of Research with the dVRK

"Robotic-assisted surgery is now well-established in clinical practice and has become the gold standard clinical treatment option for several clinical indications. The field of robotic-assisted surgery is expected to grow substantially in the next decade with a range of new robotic devices emerging to address unmet clinical needs across different specialities… In this paper, we present an extensive review of the publications that have been facilitated by the dVRK over the past

decade. We classify research efforts into different categories and outline some of the major challenges and needs for the robotics community to maintain this initiative and build upon it."
Source: Cornell University

Robotics and AI for Teleoperation, Tele-Assessment, and Tele-Training for Surgery in the Era of COVID-19: Existing Challenges, and Future Vision

"This perspective article evaluates the use of robotics and AI in 1) robotics-assisted surgery, 2) tele-examination of patients for pre- and post-surgery, and 3) tele-training for surgical procedures. Surgeons interact with a large number of staff and patients on a daily basis. Thus, the risk of infection transmission between them raises concerns. In addition, pre- and post-operative assessment also raises concerns about increasing the risk of disease transmission, in particular, since many patients may have other underlying conditions, which can increase their chances of mortality due to the virus. The pandemic has also limited the time and access that trainee surgeons have for training in the OR and/or in the presence of an expert. In this article, we describe existing challenges and possible solutions and suggest future research directions that may be relevant for robotics and AI in addressing the three tasks mentioned above."
Source: NCBI

The Emerging Role of Robotics in Pelvic Exenteration Surgery for Locally Advanced Rectal Cancer: A Narrative Review

"Pelvic exenteration surgery for locally advanced rectal cancers is a complex and extensive multivisceral operation, which is associated with high perioperative morbidity and mortality rates. Significant technical challenges may arise due to inadequate access, visualisation, and characterisation of tissue planes and critical structures in the spatially constrained pelvis. Over the last two decades, robotic-assisted technologies have facilitated substantial advancements in the minimally invasive approach to total mesorectal excision (TME) for rectal cancers. Here, we review the emerging experience and evidence of robotic assistance in beyond TME multivisceral pelvic exenteration for locally advanced rectal cancers where heightened operative challenges and cumbersome ergonomics are likely to be encountered."
Source: MDPI