

Robotics





Introducing Robotics

Proponents of robotics aim to automate cumbersome or dangerous jobs to improve quality by eliminating errors, and to slash manufacturing costs by replacing increasingly expensive labor with cheaper machines. Initially, robots were used only for large industrial machines aimed at performing repetitive tasks. These industrial robots operated in fixed scenarios and did not require mobility. However, leveraging advancements in AI, robots are now able to navigate dynamic scenarios, as in the case of driverless cars, and have improved dexterity to the point that they can interact with the environment with increasingly human-like traits, example humanoid robots.

Demand for robotics and automation has soared. The global robotics market size reached USD 53.2 billion in 2024. Looking forward, the market is expected to reach USD 178.7 billion by 2033, exhibiting a growth rate (CAGR) of 16.35% during 2025-2033.¹ Key market drivers are rapid technological advancements in artificial intelligence and machine learning, increasing labor shortages and escalating labor costs, growing demand for automation, significant expansion in applications, and friendly government initiatives and funding.

The true potential of this technology may be gauged by the fact that many of the world's biggest tech giants are locked in a race to acquire this technology. Elon Musk claims Optimus (humanoid) robots could

make Tesla a USD 25 trillion company — more than half the value of the S&P 500 today.² On the other hand, Figure AI, a humanoid robotics startup, raised USD 675 million from investors including Jeff Bezos of Amazon, Nvidia, Microsoft and OpenAI.³ Amazon has already placed humanoid robots called Digit in warehouses alongside workers.⁴

Amazon has been pushing to automate the entire delivery chain including optimizing warehouse operations to non-stop delivery via unmanned drones. The warehouse robotic setup, Sequoia, has improved the efficiency of the already-efficient Amazon warehouse by 75%. Furthermore, 15% reduced incidents have been



¹ Robotics Market Size, Industry Statistics & Forecast [2033]. (2024, November 26). Retrieved from <https://www.imarcgroup.com/robotics-market>

² Kolodny, L., & Levy, A. (2024). Elon Musk claims Optimus robots could make Tesla a \$25 trillion company — more than half the value of the S&P 500 today. CNBC. Retrieved from <https://www.cnbc.com/2024/06/13/elon-musk-says-optimus-robots-could-make-tesla-25-trillion-company.html>

³ Palmer, A. (2024). Humanoid robot startup Figure AI valued at \$2.6 billion as Bezos, OpenAI, Nvidia join funding. CNBC. Retrieved from <https://www.cnbc.com/2024/02/29/robot-startup-figure-valued-at-2point6-billion-by-bezos-amazon-nvidia.html>

⁴ Jones, C. (2023). Fears of employee displacement as Amazon brings robots into warehouses. The Guardian. Retrieved from <https://www.theguardian.com/technology/2023/oct/18/amazon-robot-warehouses-digit-workers>

reported.⁵ In 2020, the US Federal Aviation Authority granted Amazon an Air Carrier Certificate, allowing the company to operate as an airline and deliver thousands of small packages weighing under five pounds using drones.⁶ Jeff Bezos went on CBS's 60 Minutes to announce his company intended to deliver parcels by drone within 30 minutes, making Amazon deliveries as quick as "a trip to the store".⁷ The race to improve efficiency is on.

“
AI is going to profoundly change the world. One of the most significant ways is in self-driving. We're putting a lot of effort into self-driving for cars... and I think we're quite close to having the car fully autonomous. – **Elon Musk**



Robotics: The Global Outlook

The International Federation of Robotics estimates that there are approximately 4.28 million industrial robot units operating in factories worldwide - an increase of 10% on the year before.⁸ Annual installations crossed the half million units mark for the third year in a row. By region, 70% of all newly deployed robots were installed in Asia, 17% in Europe and 10% in the Americas.

“
The annual installation figure of 541,302 units in 2023 is the second highest in history. It is only 2% lower than the record of 552,946 units installed in 2022. – **Marina Bill, President of the International Federation of Robotics**

⁵ Bishop, T. (2023). A first-hand look at Amazon's new 'Sequoia' warehouse robotic system. GeekWire. Retrieved from <https://www.geekwire.com/2023/a-first-hand-look-at-amazons-new-sequoia-warehouse-robotic-system-in-action>

⁶ Vaughn College. (2024). Amazon's Prime Air Drone Delivery Program Receives FAA Approval for Beyond Visual Line of Sight | Vaughn College. Vaughn College. Retrieved from <https://www.vaughn.edu/blog/amazons-prime-air-drone-delivery-program-receives-faa-approval-for-beyond-visual-line-of-sight>

⁷ Day, M. (2024). Amazon Approval From FAA Gives a Boost to Drone Delivery Program. Bloomberg. Retrieved from <https://www.bloomberg.com/news/newsletters/2024-06-05/amazon-approval-from-faa-gives-a-boost-to-drone-delivery-program>

⁸ Day, M. (2024). Amazon Approval From FAA Gives a Boost to Drone Delivery Program. Bloomberg. Retrieved from <https://www.bloomberg.com/news/newsletters/2024-06-05/amazon-approval-from-faa-gives-a-boost-to-drone-delivery-program>

The growth patterns are very revealing, particularly the role of Asia. China is the world's largest market, accounting for over 51% of global installations alone. Japan is the second largest market behind China. India also showed strong figures. In the US, robot installations actually fell by 5% while Canada showed a 37% rise. Europe showed an overall increase, primarily in traditionally strong car manufacturing countries, such as Spain and Germany.



Are we prepared for the autonomous car revolution?

The upcoming revolution in autonomous vehicles is expected to transform transportation, with significant implications for safety, efficiency, and urban planning. With nearly 94% of traffic accidents attributed to human error, the widespread adoption of AVs has the potential to drastically reduce fatalities and injuries on the roads. As these vehicles become more integrated into everyday life, we can expect improvements in traffic flow, reduced congestion, and lower emissions.

vehicles faces considerable challenges. Technological hurdles remain, including ensuring the reliability of sensors, software, and decision-making algorithms in diverse driving conditions. Public acceptance and

Despite the promising advantages, the transition to autonomous



trust are also critical; surveys indicate that only about 60% of people are comfortable with the idea of riding in fully autonomous vehicles.

To promote the adoption of autonomous vehicles, a robust policy framework will be essential. Governments could incentivize AV research and development through grants and tax breaks, while also establishing clear guidelines for safety testing and certification. Infrastructure investment, such as

smart traffic signals could further enhance the functionality of AVs.

The figure below shows a New York street in 1900, which was dominated by horse-and-carriages and had only one car (highlighted in red). In the next picture, taken 10 years later all the carriages were replaced by cars.⁹ The fundamental lesson here is that technology revolutions are usually swift and it is essential to act fast if we are to capitalize on them.

Easter morning 1900: 5th Ave, New York City. Spot the automobile.



Source: US National Archives

Easter morning 1913: 5th Ave, New York City. Spot the horse.



Source: George Grantham Bain Collection



⁹ Evans, S. (2024). Elon Musk on the Future of AI, Self-Driving Cars at Bosch Connected World. IOT World Today. Retrieved from <https://www.iotworldtoday.com/transportation-logistics/elon-musk-on-the-future-of-ai-self-driving-cars-at-bosch-connected-world->

Waymo Open Dataset Challenge Winners 2024

Waymo is the world's first autonomous ride-hailing service.¹⁰ The company has announced a set of research challenges involving their open dataset of high resolution sensor data collected by Waymo self-driving cars in a wide variety of conditions.¹⁰



Ahammad Nadeem CEO VisionRD
Osama Amjad MS (AI&AS), SEECS, NUST

Since launching the Waymo Open Dataset in 2019, over 40,000 researchers have used it as a high-quality tool to explore topics in autonomous vehicles, robotics, as well as computer vision and machine learning more broadly. In the last five years, scientists have published over 2,000 academic papers either citing the Waymo Open Dataset or using it as a benchmark for their own research.

VisionRD, a startup company based in the National Science & Technology Park (NSTP) in Islamabad, became the first Pakistani company to participate in Waymo Open Challenge and was ranked 3rd in this prestigious global competition.¹¹

Robotics for Developing Economies: How Robots Can Help in Agriculture

Low-cost robotics technology can assist developing economies in various critical sectors including agriculture, energy and digital connectivity. Agriculture is a good use case where drones can help increase per-hectare crop yield.

per-hectare crop yield, weeds are becoming resistant to these chemicals.¹² Stronger chemicals are therefore required to kill weeds and these end up affecting the overall fertility of the soil and poison the water table.

Weeds are a common problem for farmers, which consume resources such as water and fertilizer and impact the overall productivity of a farm. Herbicides are typically sprayed on crops to kill weeds, and, although herbicides have improved the

Demonstrations have indicated that robots, particularly drones, can undertake precise killing of these weeds by detecting them through cameras. This has resulted in 80 % less herbicide usage to control weeds.¹³

¹⁰ Weisenthal, J. (2011). 5th Avenue, 1900 Vs. 1913. Business Insider. Retrieved from <https://www.businessinsider.com/5th-ave-1900-vs-1913-2011-3>

¹¹ Waymo - Self-Driving Cars - Autonomous Vehicles - Ride-Hail. (2024, July 30). Retrieved from <https://waymo.com>

¹² Challenges Overview - Waymo Open Dataset. (2024, August 06). Retrieved from <https://waymo.com/open/challenges>

¹³ Managing And Avoiding Herbicide Resistance | Nuseed Europe. (2023, January 18). Retrieved from <https://nuseed.com/eu/managing-and-avoiding-herbicide-resistance0>

Robotics in Pakistan

In terms of industrial automation, Pakistan's manufacturing sector is gradually embracing robotics to enhance efficiency and productivity. According to the International Federation of Robotics, the density of industrial robots in Pakistan was approximately 2.5 robots per 10,000 employees in 2021, a figure that is expected to rise as industries seek to modernize operations.



Authority of Pakistan has issued new rules mandating registration of drones.¹⁶

On the educational front, several universities in Pakistan have established dedicated robotics programs. The National University of Sciences and Technology (NUST) and the University of Engineering and Technology (UET) Lahore are at the forefront, offering specialized degrees and research opportunities in robotics and automation. A report by the Higher Education Commission of Pakistan indicated that as of 2022, over 20 universities across the country had developed robotics and automation curricula.¹⁷

The Government of Pakistan has recently initiated many skill development programs offered freely to unemployed youth. The National Vocational and Technical Training Commission (NAVTC) has managed to train 85,000+ workforce in high impact technologies like machine learning and robotics.¹⁸ Moreover, a host of edtech companies like LearnoBots,



Major sectors such as textiles, automotive, and food processing are beginning to integrate robotic systems. For instance, companies like Khaadi and Nishat Mills are exploring robotic solutions to streamline their production lines, reducing labor costs and improving product quality.¹⁵ Drones are actively being used for agricultural purposes such as tracking data on crops and fighting pests, surveilling remote locations and monitoring large events such as political rallies, and also to track street crime. This year, the Civil Aviation

Robokids and Edvon are tailoring robotics, coding, and AI trainings directly for children and teenagers. Events such as the Robocon Pakistan competition encourage

students to innovate and compete in robotics, fostering a culture of creativity and technical skill development.

Representation of Pakistan at IROS 2024

The International Conference on Intelligent Robots and Systems (IROS) is one of the largest and most important robotics research conferences in the world, attracting researchers, academics, and industry professionals from around the globe. Established in 1988, IROS is highly competitive and selects the most innovative ideas related to robotics. Two robotics labs in Pakistan were invited to present their work at IROS this year.



Dr. Muhammad Haroon Yousaf, Professor/Chairman of Computer Engineering at University of Engineering and Technology Taxila, and an expert on drone technology, was invited to conduct a workshop on Edge AI for Aerial Robots: Enhancing Drone Operations with AI.

Dr. Muhammd Latif Anjum, Director of Robotics and Machine Intelligence (ROMI) lab at the NUST School of Electrical Engineering and Computer Science (SEECs), and his team presented their work on reinforcement learning "Deeper Introspective SLAM: How to Avoid Tracking Failures Over Longer Routes?" at IROS.



The focal point for robotics research in Pakistan is the National Centre of Robotics and Automation (NCRA) which is a government-funded consortium of 11 research labs situated in over 13 universities in

Pakistan. Headquartered at the NUST College of E&ME, NCRA aims to use researchers, scientists, and experts to power a robotics revolution in Pakistan.¹⁹ NCRA labs actively publish research papers and

¹⁵ Cengiarlan, F. (2020). Nishat Mills Ltd. Found the Solution in 201-SF Cots Grinding Machine. *Textilegence Magazine and Digital Platform*. Retrieved from <https://www.textilegence.com/en/nishat-group-201-sf>

¹⁶ Butterworth-Hayes, P., & Bielby, K. (2024). Pakistan issues new rules on UAS registration - Unmanned airspace. Retrieved from <https://www.unmannedairspace.info/latest-news-and-information/pakistan-issues-new-rules-on-uas-registration>

¹⁷ Higher Education Commission, Pakistan (2022). Annual Report 2021-2022. Retrieved from <https://www.hec.gov.pk/english/news/AnnualReports/Annual%20Report%202021-22.pdf>

¹⁸ NAVTC - National Vocational & Technical Training Commission. (2024, August 06). Retrieved from <https://navtc.gov.pk>

¹⁹ NCRA | National Centre of Robotics and Automation. (2024, May 05). Retrieved from <https://ncra.org.pk>

spin off startups in this space. NRCA also conducts a yearly Robotics Startup Challenge in partnership with UNICEF and Ignite Technology Fund centered around different themes. Another major event is the

National Engineering and Robotics contest, which launched in 2003, and has now become one of the biggest robotics competitions in Pakistan, with over 150 participating teams every year.

Robotics Companies in Pakistan

Robotics companies have excited considerable interest in Pakistan. They can be broadly classified into the following categories - training and development, health and wellness, industrial solutions, and drones (commercial and personal).



Robotics-World (Pvt.) Ltd

Robotics World is a robotics and automation solutions provider specializing in the development of cutting-edge technology for various industries. The company is focused on bringing innovative robotics solutions that address local and global challenges, particularly in education, manufacturing, and smart systems. Their offerings range from educational robotics kits to advanced industrial automation systems, aiming to foster a culture of technological advancement within Pakistan and beyond.

Robotics World has been recognized for its contributions to the field of robotics and STEM education in Pakistan. The company has actively participated in national and international robotics competitions, notably playing a significant role in events like the World

Robot Olympiad (WRO) as the National Organizer. Robotics World caters to a wide audience, from young students to large-scale industrial clients. Their participation in the World Robot Olympiad highlights their influence in the educational sector, providing robotics training and resources to numerous schools and universities across Pakistan. The company's growth is supported by a team of experts dedicated to developing customizable robotics solutions that meet the specific needs of various industries, making them a key player in Pakistan's burgeoning robotics sector.

Popular Products:

- ▶ **DIY Robotics Kit**
- ▶ **3D simulated & Virtual Reality-enabled labs**
- ▶ **STEM Web & Mobile Applications**



Bioniks

Bioniks produces affordable and sophisticated prosthetic limbs for amputees, including children. These lightweight limbs utilize cutting-edge brain-controlled technology, together with smartphone scanning, 3-D printing, and a simplified at-home fitting process.

Bioniks' offerings have secured numerous local and international awards and widespread recognition: they recently secured first place in the Innov8 Startup Competition.²⁰ Their contributions were also prominently showcased in the AI for Good Innovation Factory organized by the United Nations International Telecommunication Union.²¹

Bioniks view their work primarily as a social and humanitarian mission to provide support and care to differently-abled persons. In terms of impact, their bionic limbs have been used for 2.6 million hours, completing 21.9 million movement cycles.²² These products have had a transformational impact on the lives of several users,



enabling them to regain their self-confidence and return to the workforce. Bioniks estimates that these success stories infuse up to an estimated USD 650,000 into the local economy. Bioniks also helps arrange sponsors for deserving cases.

Primary Projects:

- ▶ **Black X**
- ▶ **Hero**
- ▶ **Hand And Arm Prosthesis**
- ▶ **Zindagi 2.0**



*I was born without a hand and faced many challenges in daily life. People often stared at me, and other kids avoided me when I went out to play, making me feel lonely at school. Each day was a struggle, and I felt different and excluded. After many hardships, I discovered Bioniks, a company that makes prosthetic arms. Getting my new arm from them was a turning point in my life. Thanks to Bioniks, I now feel capable and complete. **Emaan Fatima**²³*

²⁰ Bioniks Facebook: https://www.facebook.com/story.php/?story_fbid=507972441562900&id=100070504447586

²¹ AI for Good Summit: Digital and technological divide is no longer acceptable, June 3, 2024, United Nations News. Link: <https://news.un.org/en/story/2024/05/1150451>

²² <https://bioniks.org/impact/>

²³ Emaan Fatima - Bioniks. (n.d.). <https://bioniks.org/emaan-fatima>



Arm Rehab

Arm Rehab Technology is a company focused on developing affordable and accessible robotic rehabilitation solutions. Their primary product is an advanced mind-controlled robotic prosthetic hand. This prosthetic hand features multiple grasp patterns, two-day battery life, lightweight construction and natural appearance. It also has the ability to carry up to 10 kg, and a durable linkage mechanism. Arm Rehab Technology aims to empower over 50,000 amputees in Pakistan.²⁴

Arm Rehab is affiliated with several hospitals, including the National Institute of Rehabilitation Medicine in Islamabad and the Pakistan Society for Rehabilitation of Differently Abled in Lahore. In June 2024, Arm Rehab was



selected for the regional round of the Global Startup Awards among SAARC countries.²⁵ Arm Rehab has also been part of the Shahjehan S. Karim Incubation Centre at IoBM (Institute of Business Management) Pakistan and was the winner of the HEC Innovator Seed Fund Program and Startup Grant Challenge 2022.

²⁴ <https://nep.pitb.gov.pk/node/298> "Arm Rehab," <https://www.armrehabtech.com/>.

²⁵ Shafique, Muhammad Hamza. "Muhammad Hamza Shafique on LinkedIn: We Are Pleased to Announce That Arm Rehab Has Been Selected for Global.," June 24, 2024. <https://www.linkedin.com/feed/update/urn:li:activity:7210956885284319232/>.



UAS Global

UAS-Global is a leading provider of advanced security solutions to the military and commercial sectors: it is an authorized supplier to the Pakistan Ministry of Defence and Armed Forces, and also a leading commercial distributor.

UAS-Global comprises a team of security specialists who have pioneered the use of unmanned aerial vehicles (UAV) in Pakistan. Their core expertise is in unmanned aerial vehicles, aerial surveillance, surveys, mapping, and counter-UAV systems across Pakistan and the Middle East region. Their notable



product is the ZF-1 UCAV drone, a stealth drone capable of both air-to-air and air-to-ground operations. Their UAVs are also used for solar panel and wind turbine inspections, while their agricultural drones can survey farms to facilitate high yields.

UASG showcased their offerings in IDEAS 2016 and 2018 organized by the Defence Export Promotion Organization (DEPO).

Primary Projects:

- ▶ Anti-Drone Systems
- ▶ UAV
- ▶ Aerial Mapping and Counter





SATUMA

SATUMA Pvt. Ltd. specializes in indigenous manufacturing of aviation and aerospace components and builds advanced aerial vehicles, ground control stations, UAV simulation software, UAV trainers, and target drones. Their Ground Control Station (GCS) acts as the nerve center for managing unmanned aerial operations, featuring intuitive software solutions and robust system architecture.

SATUMA is committed to delivering cutting-edge and comprehensive technology solutions and services for Pakistan's UAV industry. Their iHawk series provides versatile drones for different tasks, ranging from simple daytime monitoring to advanced stable imaging. Their surveillance drones lineup includes Salaar, Super Salaar, Flamingo, and Bravo+ models, designed for a wide variety of different applications. SATUMA also provides products and services to neighbouring countries, including Sri Lanka, Oman, and Saudi Arabia.

The company site is located in Islamabad. The facility is equipped with an engineering floor area of 5,000 square feet as well as a dedicated air strip for testing and evaluating scaled airframes.

Primary Projects:

- ▶ **Advanced Aerial Vehicles**
- ▶ **Ground Control Stations**
- ▶ **UAV simulation software**
- ▶ **UAV Trainers** ▶ **Target drones**



M/S SATUMA (Private) Limited Pakistan is a well-established and reputed company that has earned a place in the history of Pakistan Air Force (PAF) by establishing the first UAV Squadron in 2003. After the formation of UAV Squadron, SATUMA (Private) Limited has also assisted PAF in acquiring necessary maintenance and operational capabilities for the UAVs.
- Vice Chief, Pakistan Air Force²⁶

It is with my highest level of confidence that I write to convey my strong support and praise upon the professionals at SATUMA (Private) Limited of Pakistan. It has been the experience of FLIR Systems, Inc. that SATUMA (Private) Limited is composed of a solid corps of professionals who are fast, flexible and responsive. I continue to be impressed with the knowledge and curiosity that exists within this fine company.
- Vice President FLIR²⁷

ADBLED

Adbled Pvt Ltd. is one of the earliest industrial robotic manufacturing start-ups in Pakistan. The company develops robotic arms, CNC machines, and their constituent components, as well as provides full-fledged industrial automation solutions. The company's mission is to enhance the quality, efficiency, and robustness of local manufacturing and production lines and thereby advance the industrial manufacturing sector in Pakistan. Adbled supplements its offerings



ADBLED Team has manufactured the first 400-volt servo drive for their robotics purposes in Pakistan.³¹



with consultancy services for engineering product design and development. Adbled is further working to enhance its robotics product line with an AI-based inventory management system, to create a fully automated robot warehouse solution which will not require human management and intervention.²⁸

Primary Projects:

- ▶ **Industrial Robotic Arms**
- ▶ **CNC Machines²⁹**
- ▶ **Zero-backlash Gearboxes³⁰**
- ▶ **Servo-motors**



²⁶ SATUMA (Private) Limited." 2024. Satuma.com.pk. 2024. <https://satuma.com.pk/>
²⁷ SATUMA (Private) Limited." 2024. Satuma.com.pk. 2024. <https://satuma.com.pk/>

²⁸ Services | ADBLED Pvt. Ltd. (2023, June 21). Retrieved from <http://adbled.com/services.html>
²⁹ Computer Numerical Control machines, are automated manufacturing devices that use computer programming to control the movement and operation of tools
³⁰ A zero-backlash gearbox gearbox is a type of mechanical transmission system designed to eliminate backlash, which is the play or loose movement between meshing gear teeth when the direction of load is reversed
³¹ PRE: Pakistan Robomation Expo. (2022, July 22). 15 Minutes with Startup | Adbled [Video]. YouTube. <https://www.youtube.com/watch?v=nWgCgD52o9o>



Integrated Dynamics

Integrated Dynamics (ID) is a pioneering Pakistani company in the aviation and aerospace sectors. Established in 1997, they provide design, consultancy, and turn-key project commissioning for unmanned aerial vehicle (UAV) systems, providing services across the entire development cycle from concept to prototype flight tests.

Their product suite is comprehensive and features UAV platforms, flight control systems, command and control (C4I) systems, datalinks, payloads, ground control stations, and accessories like ground support equipment and battery management systems. Their civilian UAV systems are designed for law enforcement purposes, border and coastal patrol, and scientific research. ID also offers custom airframes for specialized UAV applications. They have exported products to the United States, Australia, South Korea, Spain, and Libya.

The company entered the fast-growing civilian applications market of (custom multi-rotor platforms) with



its HUMMER multi-copter and SPIRIT Hybrid VTOL fixed-wing platforms.³² Both systems were developed for export customers and feature an extended sensor suite capability for increased endurance and reliability. Potential applications of these systems include drone delivery, search and rescue operations, land mapping and reforestation. ID launched its first High-Altitude Pseudo-Satellite (HAPS) UAV, the SOLARIS at the 2019 Dubai Air Show.³³ SOLARIS has an operational range of 200 km (extendable to over 1,000 km) and can fly at altitudes of 6-10 km. Priced under USD 100,000, this low-cost civilian UAV weighs 13 kg and has a 24-hour endurance (with plans to extend this to four days). ID is also developing the STRATOS, a larger UAV capable of operating at up to 22 km altitudes and staying airborne for up to four months, with a payload capacity of 12 kg.³⁴

Other notable ID products include the SKYCAM-W, a blended wing UAV with 90+ minutes flight time and a 50-km range, and the TORNADO, a mini-turbojet decoy system with a range of over 200 km.

Popular Products:

- ▶ **The TORNADO**³⁵
- ▶ **The STRATOS HAPS**^{36,37}
- ▶ **The SKYCAM-W**³⁸

³² HUMMER MULTI-COPTER and SPIRIT HYBRID VTOL – INTEGRATED DYNAMICS. (2024, July 24). Retrieved from <https://idaerospace.com/2016/12/04/hummer-multi-copter-and-spirit-hybrid-vtol>

³³ INTRODUCING THE SOLARIS. – INTEGRATED DYNAMICS. (2024, July 24). Retrieved from <https://idaerospace.com/2019/11/11/solaris-is-hypersat-hsat-and-a-new-website>

³⁴ Khan, B. (2019). Pakistan's Integrated Dynamics Reveals Pseudo-Satellite Project. Quwa. Retrieved from <https://quwa.org/daily-news/pakistans-integrated-dynamics-reveals-pseudo-satellite>

³⁵ Tornado – INTEGRATED DYNAMICS. (n.d.). http://idaerospace.com/tornado/?fbclid=IwZXhobgNhZW0CMTA-AAR1koLxUmoBjFmT6qIbW5UQc2o-kQWRkLXjEZHltdh3wXt9OVc4QyPfc_aem_NkqgNkWFoMfcgDNsCkn_lw

³⁶ Khan, B. (2019, December 17). Pakistan's integrated dynamics reveals Pseudo-Satellite project. Quwa. <https://quwa.org/daily-news/pakistans-integrated-dynamics-reveals-pseudo-satellite/>

³⁷ Solaris – IN TEGRATED DYNAMICS. (n.d.). <https://idaerospace.com/solaris/>

³⁸ SKYCAM – WING – INTEGRATED DYNAMICS. (n.d.). http://idaerospace.com/skycam-wing-2/?fbclid=IwZXhobgNhZW0CM-TAAARoolMPY0uwGagJgQBgzbtYIAfHcJGOSZTnaitScxFzdlSNGzPpaN6LXZw_aem_OCzvrG1kuEu68PdH-DHcw

TALK TO US



Do you run a business in the Robotics industry?

Get in touch with your details now at

mkt@pseb.org.pk

and we'll take it from there.

Also email us for any comments, suggestions or errors in this whitepaper.

For more information on registered companies, please visit

<https://techdestination.com>

About this Industry Roundup

Pakistan Software Export Board developed this paper by hiring services of independent consulting firms to prepare this roundup on Pakistan's Robotics sector. The paper focuses on Pakistan-based companies in this vertical and appraises the reader of the expertise available in Pakistan in this domain.

Disclaimer

All the information provided in this roundup is compiled by the consulting firms and based on the available material about the companies covered in this roundup. Coverage in this industry roundup document is not an endorsement by Pakistan Software Export Board (PSEB), Ministry of Information Technology and Telecommunication (MoITT) or the Government of Pakistan (GOP). The Pakistan Software Export Board, Ministry of Information Technology and Telecommunication, or the Government of Pakistan assumes no commercial financial or legal liability accruing from any transactions with the firms featured in this industry roundup.

A product of TECH destiNATION Media

Commissioned by:

