

Technical Manual: Pre-Operational System Check (POSC)

Subject: Missile Launch Platform (MLP) Deployment

Compliance: MIL-STD-38784 (General Style and Format) / MIL-DTL-81310

1. Scope & Purpose

- 1.1. This document is intended to lay down mandatory procedures for Pre-Operational System Check (POSC) of the Missile Launch Platform (MLP) in all operational theaters of Air Force and Navy forces. There is a need to ensure strict compliance with MIL-STD-882E and MIL-DTL-81310 to ensure high levels of safety awareness. This scope includes all mission-critical inspections required to ensure total integrity of the hardware, thereby ensuring combat effectiveness.
- 1.2. This process must be followed by all individuals involved in working with ordnance, maintaining systems and launching control. Skipping any step in this process is a violation of UCMJ guidelines.

2. Applicable Documents

- 2.1 **General** The following documents provide a basis for the Missile Launch Platform's operational integrity and ensure strict adherence to DoD procedures for safety and technical accuracy.
- 2.2 **Documents**
 - 2.2.1 **MIL-STD-38784 Standard Practice for Manuals** governs the structure and content of this manual's text and location of Warning/Caution/Note paragraphs.
 - 2.2.2 **MIL-STD-882E DoD Standard Practice System Safety** provides the required framework for hazard identification and risk mitigation in high-energy launch operations.
 - 2.2.3 **MIL-DTL-81310 Airborne Weapons/Target Systems** specifies requirements for technical manuals for Navy and Air Force weapon systems.
 - 2.2.4 **NAVSEA OP 5 Ammunition and Explosives Safety Ashore** Navy regulation covering safe use and storage of energetic materials.

2.2.5 **AFMAN 21-201 Management and Maintenance of Non-Nuclear Munitions** is the main Air Force publication covering munitions logistics and maintenance operations.

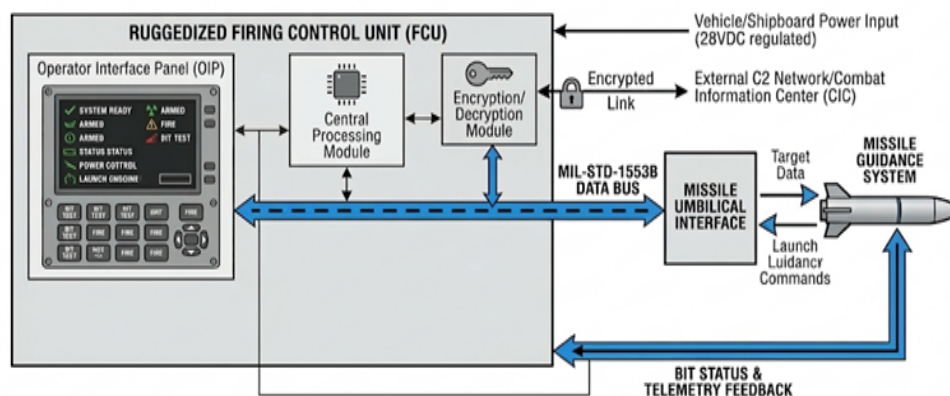
2.2.6 **MIL-STD-461G** covers requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment.

2.3 In case of conflict between this manual's text and references in this section, the text in this manual will control. However, this text does not supersede applicable federal laws and regulations unless a written exemption from the Program Manager (PM) or System Safety Groups (SSG).

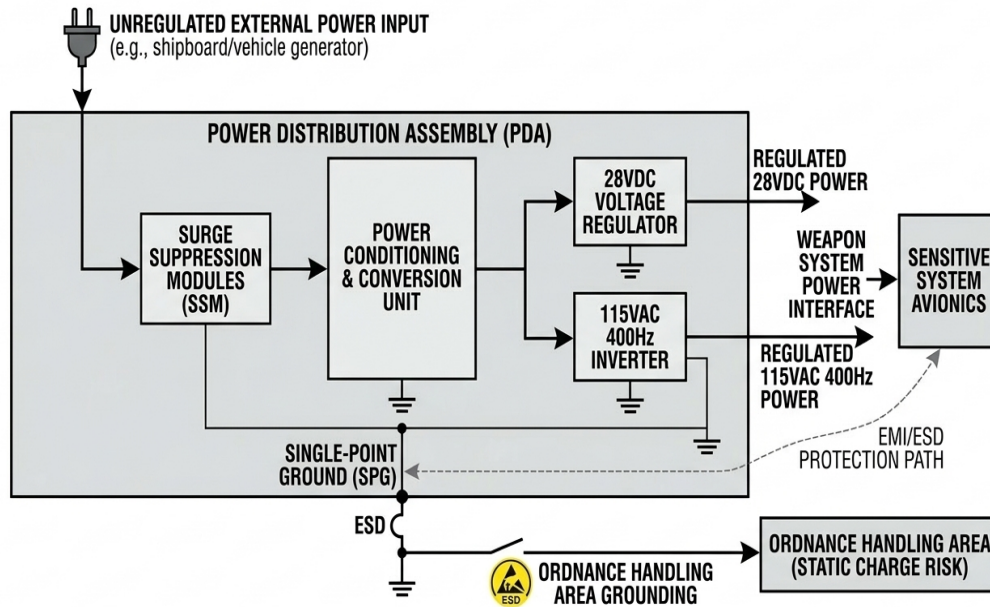
3. System Overview

3.1 **System Configuration** The Missile Launch Platform (MLP) is a highly sophisticated, multi-domain system designed to accommodate the prompt launch of precision-guided ordnance in various maritime and terrestrial environments. To ensure system readiness and operation, the system is compartmentalized into three main segments: Command and Control Interface, Power Distribution Assembly and Mechanical Launch Interface.

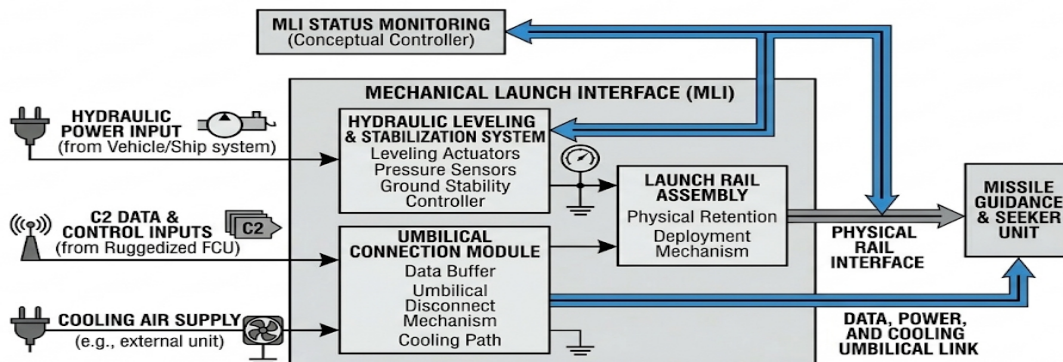
3.2 **Command and Control (C2) Interface** The Command and Control Interface is the main processing hub of the system. This interface uses a ruggedized, encrypted digital bus, MIL-STD-1553B, to enable real-time data transfer between the system operator and the missile's internal guidance system. This system segment is responsible for firing logic, continuous Built-In-Tests, and "Safe/Arm" status. Degradation of signal integrity within this system is classified as a "No-Go" condition.



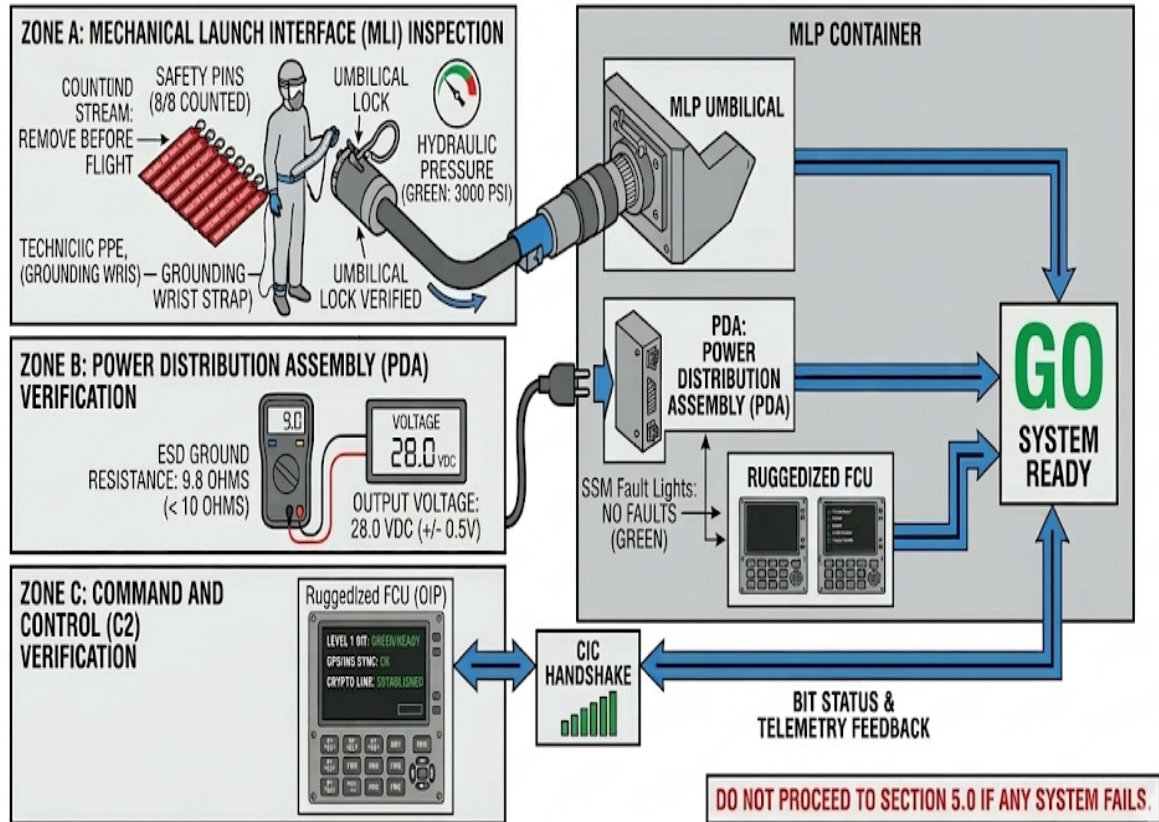
- 3.3 Power Distribution Assembly (PDA)** The Power Distribution Assembly is responsible for vehicle/ship power conversion to provide 28VDC and 115VAC, 400Hz regulated power. This system includes Surge Suppression Modules, which ensure that sensitive avionic circuitry is not compromised by electromagnetic interference and voltage spikes. Proper grounding of this system is critical to avoid electrostatic discharge during ordnance handling.



- 3.4 Mechanical Launch Interface (MLI)** This system is composed of launch rails and hydraulic leveling. This system is required to provide structural stability to accommodate high-velocity launch. The umbilical connection is a physical link that enables data uploads to the missile system, as well as providing cooling air to ensure that the seeker head is within calibrated thermal parameters.



- 4. Pre-Deployment Checks** These are mandatory inspections before the system is powered up. The objective is to detect all critical “No-Go’s,” avoid inadvertent ordnance launch and ensure full compliance with the MIL-STD-882E safety standard.
- 4.1 Mechanical Launch Interface (MLI) Inspection**
- 4.1.1 Verify the presence and readiness of all safety pins and “Remove Before Flight” streamers (total of 8) are accounted for and staged in the designated lockbox.
- 4.1.2 Verify the system hydraulic leveling actuators for leaks. System pressure must fall within the 2,800 – 3,200 PSI range.
- 4.1.3 Verify the umbilical connection is fully seated and mechanically locked. Visually inspect the blast deflector for structural integrity.
- 4.2 Power Distribution Assembly (PDA) Verification**
- 4.2.1 Verify the Single Point Ground (SPG) resistance with a calibrated multimeter. The resistance must always remain below 10 Ohms to avoid ESD during launch.
- 4.2.2 Verify the external 400Hz power connection. Verify the voltage regulators output exactly 28VDC $\pm 0.5V$. Monitor the Surge Suppression Modules (SSM) for fault indicator lights. If lit RED, abort launch immediately.
- 4.3 Command and Control (C2) Verification**
- 4.3.1 Initialize the Ruggedized Firing Control Unit (FCU).
- 4.3.2 Run a Level 1 Built-In-Test (BIT). Verify the system displays GREEN/READY for all logic boards.
- 4.3.3 Verify the system displays synchronization with the GPS/INS.
- 4.3.4 Verify the cryptographic handshake with the Combat Information Center (CIC).
- 4.3.5 Verify the thresholds for the encrypted telemetry are satisfied by the minimum SNR requirements.
- 4.4 WARNING: Do not proceed with the Section 5.0 Deployment Procedure if the system does not pass the BIT or the MLI inspection.**



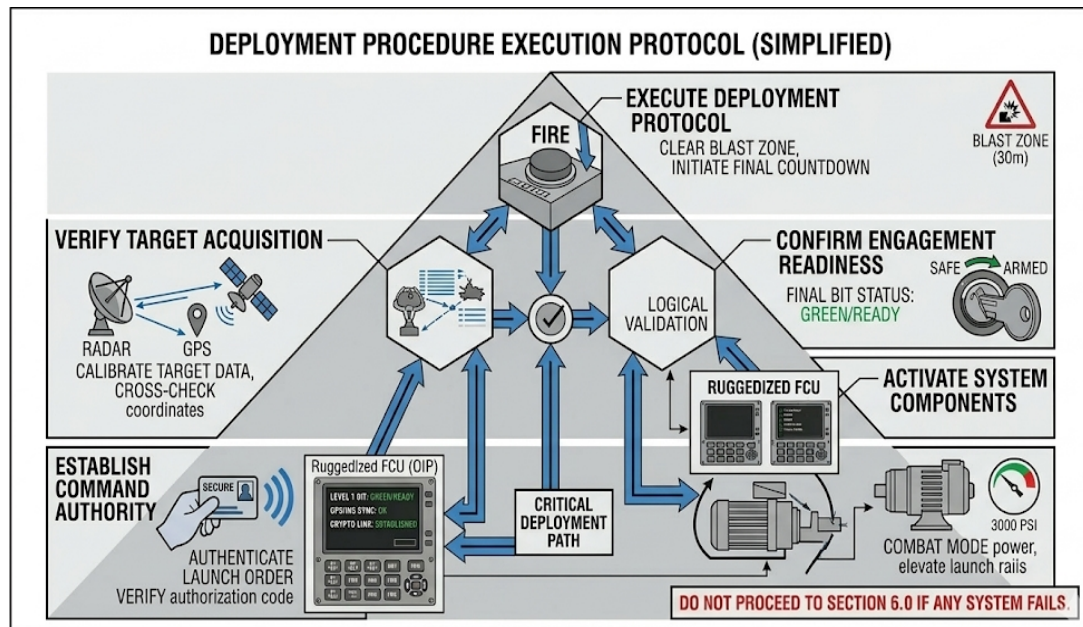
5. Deployment Procedure

This section describes a step-by-step protocol to be taken on the Missile Launch Platform (MLP). This protocol must be strictly followed to avoid system lockout, which requires a safety reset if telemetry is interrupted or if a deviation in protocol is noticed.

- 5.1 **Step 1: Establish Command Authority** Authenticate the encrypted launch order received from the Combat Information Center (CIC), then confirm the secure authorization code through the Ruggedized Firing Control Unit (FCU).
- 5.2 **Step 2: Activate System Components** Switch the Power Distribution Assembly (PDA) to "Combat Mode." Maintain hydraulic pressure at 3,000 PSI on the Mechanical Launch Interface (MLI) as launch rails rotate to desired azimuth and elevation.
- 5.3 **Step 3: Verify Target Acquisition Systems** Calibrate target acquisition systems' data on an inbound target. This step automatically verifies internal

GPS/INS coordinates through the Command and Control (C2) system against a live radar telemetry feed.

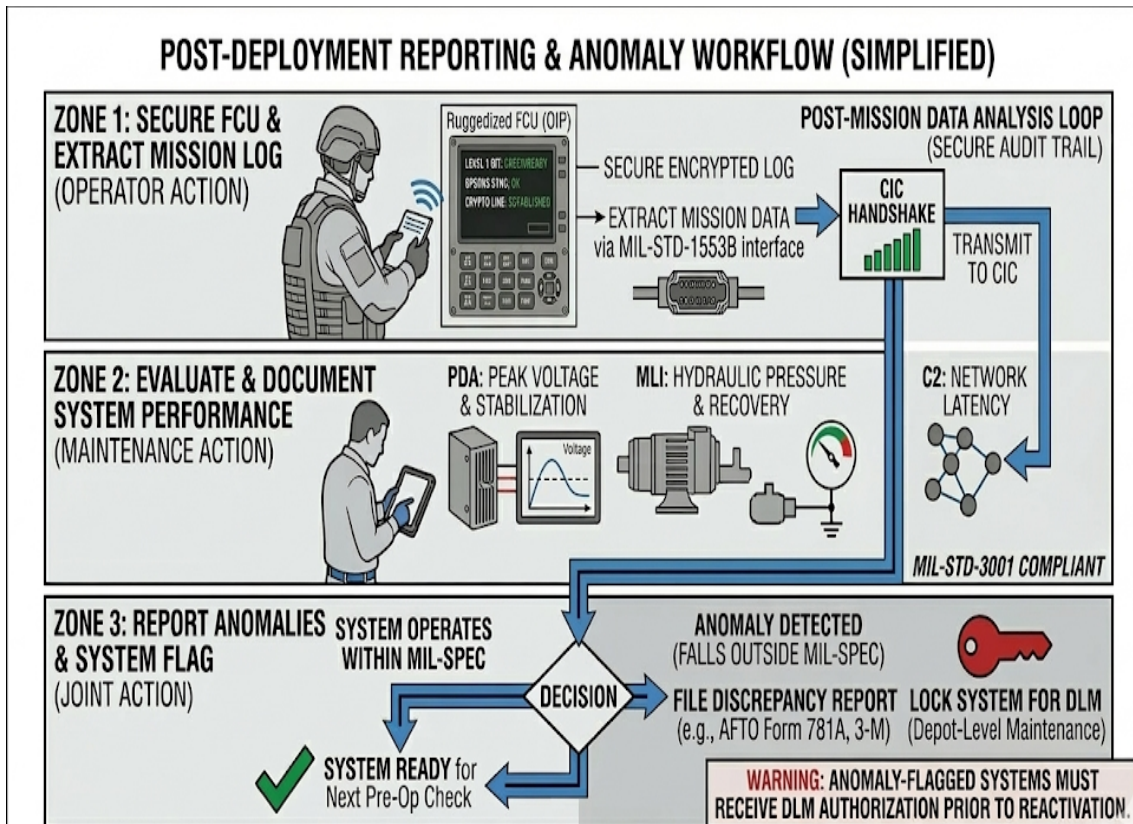
- 5.4 **Step 4: Confirm Engagement Readiness** Conduct a final Built-In-Test (BIT). Verify a solid "GREEN/READY" display through the FCU. Physically move the 'Safe/Arm' switch to 'ARMED' position.
- 5.5 **Step 5: Execute Deployment Protocol** Once the 30-meter launch blast zone has been visually and digitally cleared, the 'FIRE' control is pressed to initiate an irreversible final countdown.



6. **Post-Deployment Reporting** After deployment, data extraction and reporting are required, per MIL-STD-3001. This process is intended to provide a verifiable audit trail of all system activity, verify system integrity, and quickly detect any changes from the established baseline of operation.

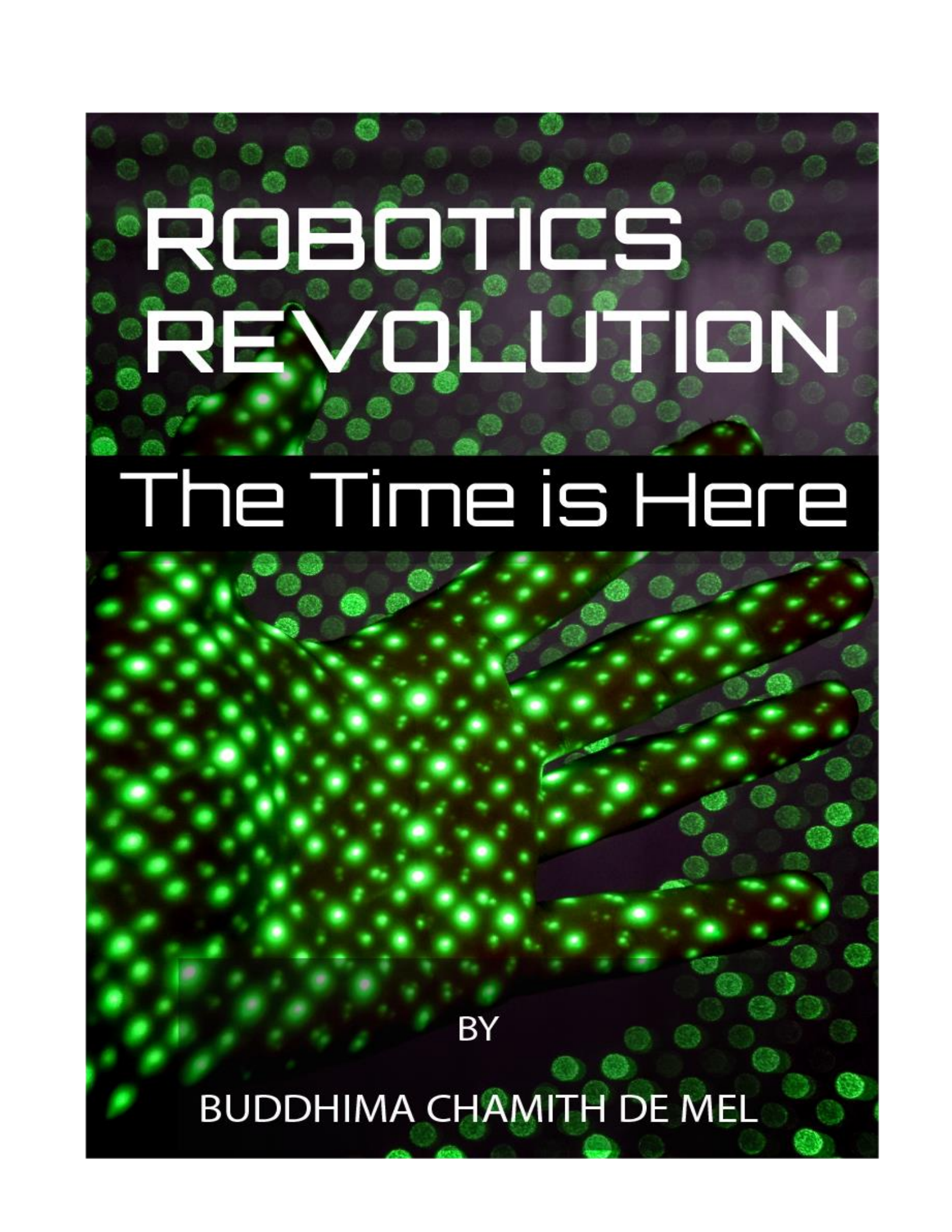
- 6.1 **Record Actions** Immediately following the deployment sequence, the operator is required to secure the Ruggedized Firing Control Unit (FCU). The encrypted mission data log, which records accurate timestamps of command authorizations, Built-In-Test (BIT) results, and ordnance separation, is required to be extracted via the MIL-STD-1553B data bus interface and routed to the Combat Information Center (CIC).

- 6.2 **Document System Performance** Maintenance and logistics personnel are required to determine and document system performance, specifically the physical telemetry data of the launch platform. Performance data includes, but is not limited to, the following parameters.
- 6.2.1 Peak voltage stabilization times within the Power Distribution Assembly (PDA).
- 6.2.2 Hydraulic pressure drops within the Mechanical Launch Interface (MLI).
- 6.2.3 Latency characteristics of the Command and Control (C2) network during the firing sequence.
- 6.3 **Report Anomalies** Component performance outside of MIL-SPEC performance characteristics is defined as an anomaly. Operators are required to immediately file a discrepancy report, using AFTO Form 781A for the Air Force or the appropriate 3-M system documentation for the Navy. Systems reporting anomalies shall be electronically locked and flagged for mandatory Depot-Level Maintenance (DLM) prior to the next pre-operational check.



7. Safety and Compliance Notes

- 7.1 The Missile Launch Platform (MLP) has high-energy systems with explosive electrical and high-pressure hydraulic potential. All personnel must always be “on the ball” and alert at all times to avoid catastrophic system failures, unauthorized ordnance discharges, and/or loss of life.
- 7.2 **Operational Safety Parameters**
- 7.2.1 **Exclusion Zones** Prior to the initiation of the Section 5.0 deployment sequence, the 30-meter radial blast and exhaust plume exclusion zone must be cleared and visually confirmed by the safety officer.
- 7.2.2 **Protective Equipment** All deck and flightline personnel must wear anti-static and flame retardant PPE. Grounding wrist straps must also be calibrated and worn during all Phase 4.0 physical inspections.
- 7.2.3 **Lockout/Tagout (LOTO)** All systems requiring DLM must strictly adhere to the LOTO protocols.
- 7.3 **Strict Procedural Compliance** The procedures outlined in this manual are carefully and precisely designed for safety and must always be followed in the exact sequence and order. Any and all unauthorized “workaround” procedures are strictly prohibited and violate the Uniform Code of Military Justice. If theater requirements mandate a “workaround,” then a digitally signed waiver authorization by the Commanding Officer (CO) is mandatory.
- 7.4 **Documentation Accuracy** Accurate documentation is vital for readiness. Physical logs must always be written with permanent black ink and Date-Time Group formats. Corrections must always be single-lined and initialed. Digital logs must utilize an encrypted and tamper-proof hashing system.

The image features a hand composed of numerous bright green, glowing particles, set against a dark background filled with a bokeh effect of similar green particles. The hand is positioned in the lower half of the frame, with fingers slightly spread. The overall aesthetic is futuristic and digital.

ROBOTICS REVOLUTION

The Time is Here

BY

BUDDHIMA CHAMITH DE MEL

Table of Contents

Robotics Revolution: Exploring the Future of Technology	04
1. Abstract	04
2. Introduction	04
3. Advancements in Robotics	05
3.1 Object Detection and Recognition	06
3.2 Predictive Maintenance	06
3.3 Gesture and Speech Recognition	06
3.4 Robotic Surgery	06
3.5 Medical Applications	06
3.6 Military Robotics	06
3.7 Autonomous Driving	07
4. Impact on Industries	07
4.1 Cobots in Corporate Sector:.....	07
4.2 Robotics in Logistics Sector	08
4.2.1 What are Logistics Robots.....	09
4.2.1.1 Types of Warehouse Robots	09
5. Challenges and Ethical Considerations	09
5.1 Impact on society	09
5.1.1 The labor market	09
5.1.2 Impact on economic growth and productivity	10
5.1.2.1 Labor-market discrimination	10
6. Inequality	10
6.1 Inequality: exploitation of workers	10
7. Sharing the benefits	11
8. Privacy, human rights and dignity	11
8.1 Privacy and data rights.....	11

8.2 Impact on human psychology	12
8.2.1 Relationships.....	12
8.2.2 Human-robot relationships.....	12
8.2.3 Human-human relationships	12
9. Conclusion	12
10. Bibliography	14

Robotics Revolution: Exploring the Future of Technology

Abstract:

The present age of robotics has resulted in tremendous developments that have transformed numerous sectors and altered how people live and work. From manufacturing and healthcare to agriculture and space exploration, robotics technology has become a game-changer, elevating production levels, precision, and overall efficiency across these diverse sectors. (Gicoh, 2023). Esteemed intellectuals have openly expressed their concerns regarding the potential ramifications of highly complex systems in the future, envisioning a dystopian scenario. However, it is essential to consider that these apprehensions must be balanced against the undeniable progress and groundbreaking achievements we have witnessed in the fields of robotics and AI (Torresen, 2018).

The shift in technology from industrial robots to service robots reflects a growing trend toward personalized systems with increased autonomy, enabling adaptable robots to operate seamlessly in human-centered environments (Haidegger, 2013). However, the concept of humanoid robots providing care as we age can evoke fear in many individuals, and the uncanny valley hypothesis, proposed by Ishiguro in 2006, sheds light on this phenomenon. According to this hypothesis, people's enjoyment of having robots around reaches a peak when robots are not too similar to humans. However, as robots become more human-like, the pleasure diminishes rapidly, potentially evoking unsettling feelings reminiscent of monsters from science fiction films. This reduction in enjoyment is attributed to a lowered realism inconsistency as robots closely resemble humans (Ishiguro, 2006).

Introduction:

Since Christopher Strachey's checker's program demonstrated its prowess on the Ferranti Mark I computer at the University of Manchester in 1951, artificial intelligence (AI) has made remarkable strides. The advancement of AI technology has placed a strong emphasis on perception and reasoning, particularly in the utilization of models and algorithms for machine learning. And generalization. These advancements have led to groundbreaking applications in various fields, such as RNA sequencing for vaccines and human speech modeling, catapulting AI into the spotlight and ensuring its enduring prominence (Copeland, 2023). This novel concept of robot evolution raises ethical concerns about the reduced human control over such evolutionary systems, given their inherent adaptability, stochastic nature, and complexity. Managing robot evolution responsibly is crucial to mitigate potential safety issues (Eiben, 2021).

Interestingly, the idea of robot evolution dates back a century, with Karel Capek's play, which coined the term "robot," published in 1920 (Reilly, 2011). The incorporation of biological evolution concepts into technology emerged in the late 20th century through computer simulations, giving birth to the field of evolutionary computing. Evolutionary algorithms have

proven highly effective in solving complex problems across scientific and technical domains, offering advantages over conventional optimization and design techniques (Ashlock, 2006)

Recent advancements in evolutionary computation, robotics, 3D printing, and automated assembly have led to the development of robotic systems capable of autonomous reproduction and evolution (Sam Kriegman, 2020). Interestingly, an intriguing aspect of their potential evolution involves exploiting ingrained emotional response patterns in humans. People may develop fondness and "affection" for these robots, creating non-technical avenues for robots to evade human control (Carpenter, 2016).

The long evolutionary history of humans has endowed our brains with various motivational and affective pathways tailored to human psychology, making us more susceptible to emotional connections (Danaher, 2019). This leads to some ethical considerations. Firstly, as these robots possess traits common to living organisms and can reproduce, they exhibit characteristics that differentiate life from non-life. Their evolutionary process further blurs the line between human-designed machines and living entities, potentially giving rise to moral obligations toward them, akin to our responsibilities toward animals (Gellers, 2020).

Secondly, the moral implications of control measures, like the implementation of a "death switch," raise significant ethical questions. Deciding whether terminating the evolution of these robotic life forms equates to shutting down a machine or ending the life of a living entity is a critical matter to address (Mahadevan, 2017). These moral considerations may shape the extent of human influence over the evolution of robots as we have envisioned..

Advancements in Robotics:

AI, deep learning, and machine learning are key technologies with unique attributes. This leverage robots to interact with the environment, make decisions, and complete complex jobs. AI and ML that use algorithms to enable robots to learn from data, progressively improving their performance. ML approaches may be used to program robots for specialized tasks like grasping, object classification, and path planning. Deep learning, a subset of machine learning, employs artificial neural networks to solve challenging tasks such as speech and picture recognition.

In challenging circumstances, sophisticated robotic systems use AI to produce robots capable of independent perception, reasoning, and action. Robots continuously improve their performance using ML by learning from their experiences. Deep learning is used to address unique issues that traditional machine learning algorithms may struggle with, such as superior voice and picture recognition. Complex tasks that were previously thought to be impossible can now be completed by advanced robotic systems because of the combination of these disparate technology. The link between AI, ML, and DL in advanced robotics analysis and development is extensive. These applications just scratch the tip of how AI, ML, and DL are used in many robotic scenarios.

Object Detection and Recognition:

Deep learning has helped robots to perform crucial tasks such as item identification and recognition. Robots can identify and categorize things in their surroundings by training neural networks with large volumes of classified data.

Predictive Maintenance:

A technique to maintenance called predictive maintenance employs AI and ML to find possible problems before they arise. Predictive maintenance algorithms can identify when a robot's parts may break down by examining data from sensors and other sources, enabling pro-active repairs or replacements. (Wo Jae Lee a, 2019)

Gesture and Speech Recognition:

Another crucial use of AI and ML in robots is gesture and speech recognition. Robots like Pepper, for instance, can detect and react to human voice and gestures, making them helpful in a number of settings like customer service or healthcare.

Robotic Surgery:

AI and ML are altering the way procedures are carried out in the realm of robotic surgery. Robotic surgeons can support human surgeons during difficult operations by employing cutting-edge algorithms, lowering the chance of problems and enhancing results. In order to help surgeons carry out complex surgeries with increased accuracy and precision, surgical robots use AI, ML, and DL.

Medical applications:

Due to their capacity to spot patterns and features that are difficult for humans to see, DL approaches are especially helpful for assessing medical photos. (Tran Le Nguyen, 2019). This can aid medical professionals in spotting minute variations in the photos that might point to the presence of a disease. Machine learning models employed in drug delivery for the treatment of infectious diseases. Infectious disease medicine delivery is improved by using ensemble algorithms, decision trees, random forests, instance-based algorithms, and artificial neural networks.

Military robotics:

In military operations, robotics is utilized for duties including bomb disposal, surveillance, and reconnaissance. To analyze data and make decisions based on the information acquired, AI and ML algorithms are used. (Sherry Wasilow, 2019)

Autonomous driving:

In order to help cars navigate the road and make autonomous driving judgments, AI and ML are deployed. Self-driving cars, for instance, employ computer vision to find and identify things on the road and ML algorithms to learn and adjust to brand-new circumstances and varying road conditions (Badr Ben Elallid, 2022). For instance, AI is used by robots like self-driving cars to identify barriers and anticipate traffic patterns. While doing so, ML algorithms use information from sensors, cameras, and GPS to determine where to travel (Ning, et al., 2021).

Impact on Industries:

The use of robots in businesses has increased recently as a result of the development of artificial intelligence, but long-term reliance on an energy-intensive development model has become a significant obstacle to achieving the "dual carbon" aim (Geng Huang, 2022). Artificial intelligence will continue to be applied in environmental governance (Ke Li, 2018), and as a result, information technology and intelligence will revolutionize environmental governance and become a future trend. Urban environmental governance can be improved holistically with artificial intelligence. For instance, Ali Cloud's ET Environment Brain project uses AI technology to deliver comprehensive ecological analysis and intelligent environmental monitoring. The International Federation of Robotics (hence referred to as IFR) estimates that there are now 3 million industrial robots in use worldwide.

Cobots in Corporate Sector:

"Cobot," short for "collaborative robot, represents a unique human-robot relationship. Unlike traditional robots, Cobots are designed to facilitate simultaneous physical interaction between humans and robots on the same production line, fostering a user-friendly environment. This close collaboration empowers operators to respond promptly to the robot's work and address pressing business needs swiftly. This essay aims to explore the vast potential of Cobots in the manufacturing domain. Various industries, such as life sciences, automotive, manufacturing, electronics, aerospace, packaging, plastics, and healthcare, have widely adopted Cobots. Leveraging Cobots in these sectors offers a significant competitive advantage by establishing sustainable shared workspaces for humans and machines. Cobots are renowned for their reliability, security, and precision, while ensuring ease of use. This new breed of industrial robots is specially designed to work alongside humans, rather than in isolation. Their practicality shines, especially in environments with limited floor space, such as office settings.

Robots can learn from humans physically leading infrastructure for a particular process or activity by using the hand-guide feature and the safety monitored stop function, which allows operations to temporarily stop based on human proximity. (Olatz De Miguel Lázaro, 2019).

In the rapidly evolving medical industry, robots have sparked a transformative shift in the way procedures are conducted, supply delivery is expedited, and sterilization is ensured. This technological advancement has allowed healthcare professionals to focus more on interacting with and providing care to patients. Intel, a leading technology provider, offers a diverse range of solutions for medical robots, including surgical-assistance, modular, and autonomous mobile robots. Beyond the confines of operating rooms, robots are now being deployed in clinical settings to support medical staff and enhance patient care. As a prime example, during the COVID-19 pandemic, hospitals and clinics have expanded their use of robots to mitigate viral exposure and address a broader spectrum of tasks. The streamlined processes and reduced risks offered by medical robotics have proven invaluable in numerous ways. For instance, robots have been instrumental in independently cleaning and preparing patient rooms, thereby minimizing person-to-person interactions in infectious disease wards. Moreover, robots equipped with AI-enabled medicine identifier software have significantly reduced the time it takes to identify, match, and dispense medications to patients within hospitals. This enhanced efficiency translates into improved patient outcomes and overall healthcare delivery. As the medical robotics field continues to evolve, we can expect even more innovative applications that will revolutionize the medical landscape and redefine the standard of patient care.

Additionally, the logistics sector is going through a transformation in a time of quick technical breakthroughs and rising emphasis on sustainability. Innovative approaches are being adopted by businesses in greater numbers as a means of streamlining operations, increasing productivity, and lowering environmental impact. The logistics industry is undergoing a change because to cutting-edge technologies like autonomous trucks and supply chain management based on block chain. The widespread use of autonomous vehicles is one of the sector's most important developments. These autonomous vehicles—self-driving drones and trucks—are revolutionizing the transportation industry by providing greater safety, lower transportation costs, and quicker delivery times. Leaders in the industry are making significant investments in R&D to advance these technologies and guarantee their seamless integration into the supply chain. In order to improve operations, the logistics sector is also making use of data analytics and artificial intelligence (AI). Companies are able to predict demand trends, optimize routes, and enhance warehouse management by analyzing massive volumes of data. Virtual assistants and chatbots that are AI-powered are also being used to improve customer support and offer individualized experiences.

The use of block-chain technology is a key trend in the logistics sector. Block-chain is transforming supply chain management by enhancing visibility, traceability, and security thanks to its decentralized and transparent nature. With the use of this technology, stakeholders may optimize paperwork procedures, check the legitimacy of commodities, and follow their movement, which prevents fraud and delays. (Rajput, 2023).

Robotics In logistics sector:

The global logistics robots market size reached **US\$ 15.2 Billion in 2022**. Looking forward, IMARC Group expects the market to reach **US\$ 58.6 Billion by 2028**, exhibiting a growth rate (CAGR) of **22.6%** during 2023-2028. (IMARC, 2023)

What are logistics Robots?

The Machines which have ability to work tirelessly and consistently without fatigue and can do things that humans can't. Equipped with AI and ML, they can help with transportation and warehouse operations, and reduce manual labor cost. Also, they can make your supply chain operations more efficient, accurate, and faster. (Rai, 2023). The term "warehouse robotics" refers to the employment of robots and automated systems for carrying out various tasks, speed up, and automate warehouse operations. Robotics continues to play a crucial part in warehouse automation and has recently acquired prominence in supply chain, distribution center, and warehouse management circles. Here are a few examples of the various kinds of warehouse robots.

Types of Warehouse Robots

Automatic guided vehicles (AGV), sometimes referred to as self-guided vehicles (GVs) or autonomous guided vehicles (AGMs), are material handling systems (MPS) or load carriers (LTCs) that move around a warehouse, distribution center, or manufacturing facility without the need for an operator or driver. An AGV plays an essential role in the delivery of inventory, materials and supplies. These vehicles can be guided along pre-defined paths using magnetic strips, track, ground-based sensors or wires. To prevent collisions, AGVs use equipment such as cameras, infrared or laser aids that detect obstacles as they move.

AMRs (Autonomous Mobile Robots), on the other hand, move within their environment without being closely monitored by an operator or following a planned route. AMRs can move across huge warehouses without set tracks by using powerful sensors. With this increased versatility, AMRs are better prepared for a variety of use cases, such as packaging, replenishment, sorting, and transportation. These robots have developed into priceless instruments for the logistics business, improving productivity, lowering costs, and satisfying the expanding needs of the e-commerce sector.

Challenges and Ethical Considerations:

Impact on society

The labor market:

Concerns over workers being replaced by technology has existed for ages. It has been prophesied that technologies like automation, mechanization, computers, and most recently, AI and robotics, will eliminate jobs and permanently harm the labor market. (1983) Leontief, Concerned that people might be displaced by machines, much as horses were rendered obsolete by the development of internal combustion engines, people began to worry about the enormous advancements in the processing capacity of computer chips. However, in the past, automation frequently replaced human labor in the short term while creating jobs in the long run. (Autor, 2015).

AI is already widely used in fields including banking, healthcare, sophisticated manufacturing, space exploration, and transportation. Drones and unmanned vehicles are now able to carry out tasks that once required human intervention. 'Blue-collar' employment have already been impacted by automation, but as computers advance in sophistication, creativity, and versatility, more jobs will be impacted and more jobs will become obsolete.

Impact on economic growth and productivity

The potential effects of AI on economic growth often excite economists. Robotics increased annual GDP growth and labor productivity in 17 nations by an estimated 0.4 percentage points between 1993 and 2007, which is comparable to the effect steam engines had on growth in the UK. (Graetz, 2015)

Labor-market discrimination:

The profound impact of technological advancements, particularly AI and robotics, will not be evenly distributed across society. Diverse demographic groups will experience varying degrees of influence, with some being more vulnerable to the effects of these changes. Individuals lacking specialized knowledge or technical skills will face significant challenges. Young people entering the job market, who will be the first generation working alongside AI, will also be disproportionately affected (Biavaschi, 2012).

Women, who are more prevalent in caregiving professions, one of the industries likely to be impacted by robots, May also face disproportionate consequences. Minority groups and those with limited financial means already contend with high unemployment rates due to prejudice, discrimination, and lack of training. Without access to high-skill training, adapting to the new economy will be even more arduous for them. Limited access to fast Internet further hampers their ability to access training, education, and job opportunities (Robinson, 2015)

Inequality

There are concerns about the progress of AI at the expense of human employees. With AI overtakes certain tasks, it could lead to a reduction in the man force with a potential of widening socioeconomic disparities by giving benefits to fewer individuals. Those who own stakes in AI-driven businesses may stand to benefit disproportionately from other with this transformation.

Inequality: exploitation of workers

Since AI is predicted to create a wide variety of new and varied types of employment, changes in employment connected to automation and digitization will not only be communicated through job losses but also in terms of job quality. The average consumer of AI technology may never know that a person was part of the process – the value chain is opaque. One of the key ethical issues is that – given the price of the end-products – these temporary workers are being inequitably reimbursed for work that is essential to the functioning of the AI technologies. This may be especially the case where the labour force reside in countries outside the EU or US – there are growing 'data-labelling' industries in both China and Kenya, for example. Another issue is with the workers required to watch and vet offensive content for media platforms such as Facebook and YouTube (Roberts, 2016).

Sharing the benefits

AI holds the potential to bring about diverse and substantial benefits for society (Conn, 2018). A 2016 US report on AI, automation, and the economy highlights the importance of ensuring equitable access to these benefits and avoiding uneven distribution. The report emphasizes that the future of AI is influenced not only by technical factors but also by various non-technical incentives. Framing the development of AI and automation as an outcome solely determined by the technology itself is cautioned against (House, 2016).

To ensure a fair distribution of AI's benefits and prevent a winner-takes-all scenario, one option proposed is to proactively declare AI as a resource for the collective good rather than a private possession (Conn, 2018). Implementing such a strategy would necessitate a shift in cultural norms and the formulation of new policies at the national and federal levels. These policies would serve as the groundwork for novel approaches that harness the positive impact of AI for all citizens, navigate the economic shifts brought by AI, and enhance public trust in AI (Min, 2018). Addressing potential economic impacts, labor shifts, inequalities, technological unemployment, as well as social and political tensions, requires the formulation of comprehensive policy recommendations, as put forth by the Future of Life Institute. In response to job losses driven by AI, the establishment of retraining programs and the provision of financial and social support for displaced workers are essential. Economic policies like universal basic income and robot taxation systems may be necessary to tackle these challenges. To address biased product design, blind spots, false assumptions, and value systems embedded in AI systems, targeted policies are recommended to assist the most vulnerable groups, including caregivers, women and girls, and underrepresented populations (Conn, 2015).

Privacy, human rights and dignity

AI will have profound impacts on privacy in the next decade. The privacy and dignity of AI users must be carefully considered when designing service, care and companion robots, as working in people's homes means they will be privy to intensely private moments (such as bathing and dressing).

Privacy and data rights

If the necessary tools aren't provided, humans won't have any agency or control over their data. One way in which AI is already affecting privacy is via Intelligent Personal Assistants (IPA) such as Amazon's Echo, Google's Home and Apple's Siri. These voice activated devices are capable of the ethics of artificial intelligence: Issues and initiatives 13 learning the interests and behavior of their users, but concerns have been raised about the fact that they are always on and listening in the background.

According to a survey of IPA customers, people's biggest privacy concern was having their device hacked (68.63%), followed by it collecting personal information on them (16%), listening to their conversations 24/7 (10%), recording private conversations (12%), not respecting their privacy (6%), storing their data (6%) and the 'creepy' nature of the device (4%) However, despite these worries, people were very positive about the devices, and comfortable using them.

Impact on human psychology

AI is getting better and better at modelling human thought, experience, action, conversation and relationships. In an age where we will frequently interact with machines as if they are humans, what will the impact be on real human relationships?

Relationships

In the future, robots are expected to serve like humans in various social roles: nursing, housekeeping, caring for children and the elderly, teaching, and more. Furthermore, robots will also explicitly be designed for sex and companionship purposes, designed to look and talk just like humans. People may tend to start emotional attachments, perhaps even feeling love for them.

Human-robot relationships

One danger is that of deception and manipulation. Social robots that are loved and trusted could be misused to manipulate people (Thomas Arnold, 2018). For instance, a hacker could seize control of a personal robot and use its special connection to its owner to deceive the owner into making purchases. Robots would have no notion of this, whereas human emotions like empathy and guilt generally prohibit us from doing this. Enjoying a friendship or relationship with a companion robot may involve mistaking, at a conscious or unconscious level, the robot for a real person. To benefit from the relationship, a person would have to 'systematically delude themselves regarding the real nature of their relation with the AI (Sparrow, 2002).

Human-human relationships

The stability of romantic or sexual relationships may be impacted by robots. For instance, if a spouse is spending time with a robot, such as a "virtual girlfriend" (catboat avatar), jealousy may develop. It's also possible to lose contact with other people and possibly to disengage from regular, everyday relationships. For instance, a person who travels with a companion robot could feel reluctant to attend occasions (like weddings) when it is customary to do so as a human-human partnership. Relationships between humans and robots may be stigmatized.

Conclusion:

Robotics surfaced as a converting force. Robots have the eventuality to be transformative for diligence and societies, and also have challenges and ethical considerations to address. Advances in robotics technology will revise varied fields, refining productiveness and safety. Still, job mobility and socioeconomic impact need to be considered. Ethical enterprises about sequestration, data security, algorithmic bias, and technology abuse call for strict regulations. Cost and availability are walls to wide relinquishment, and specialized limitations still live. Reliance on robotic systems raises enterprises about trust ability and cyber security. Social impacts, including socioeconomic inequalities, must be minimized and positive mortal-robot relations must be prioritized. By proactively addressing these vulnerabilities and pitfalls through regulations, exploration and ethical principles, we can harness the full transformative eventuality of robotics for the benefit of diligence and the whole world. Society.

Bibliography

- Ashlock, D., 2006. *Evolutionary Computation for Modeling and Optimization*. [Online]
Available at: <https://link.springer.com/book/10.1007/0-387-31909-3>
[Accessed 16 July 2023].
- Autor, D. H., 2015. *Why Are There Still So Many Jobs? The History and Future of Workplace Automation*. [Online]
Available at: <https://www.jstor.org/stable/43550118>
[Accessed 2023].
- Badr Ben Elallid, N. B. A. S. H. T. R. ., N. M., 2022. *A Comprehensive Survey on the Application of Deep and Reinforcement Learning Approaches in Autonomous Driving*. [Online]
Available at: <https://www.sciencedirect.com/science/article/pii/S1319157822000970>
[Accessed 16 July 2023].
- Biavaschi, C., 2012. *Youth Unemployment and Vocational Training*. [Online]
Available at: <https://openknowledge.worldbank.org/entities/publication/5c05413d-59c1-5853-b8bb-64556061ac26>
[Accessed 2023].
- Carpenter, J., 2016. Culture and Human-Robot Interaction in Militarized Spaces: A War Story. In: *Culture and Human-Robot Interaction in Militarized Spaces: A War Story*. s.l.:s.n.
- Conn, A., 2015. *Benefits & Risks of Artificial Intelligence*. [Online]
Available at: <https://futureoflife.org/ai/benefits-risks-of-artificial-intelligence/>
[Accessed 17 April 2023].
- Conn, A., 2018. *AI Should Provide a Shared Benefit for as Many People as Possible, Future of Life*. [Online]
Available at: <https://futureoflife.org/2018/01/10/shared-benefit-principle/>
[Accessed July 2023].
- Copeland, B., 2023. *Alan Turing and the beginning of AI*. [Online]
Available at: <https://www.britannica.com/technology/artificial-intelligence/Alan-Turing-and-the-beginning-of-AI>
[Accessed 16 July 2023].
- crea united, 2021. *Warehouse Industry Benefits from Robotics*. [Online]
Available at: <https://creaunited.com/warehouse-industry-benefits-from-robotics/>
[Accessed 17 July 2023].
- Danaher, J., 2019. *Welcoming Robots into the Moral Circle: A Defence of Ethical Behaviourism*. [Online]
Available at: <https://link.springer.com/article/10.1007/s11948-019-00119-x>
[Accessed 16 July 2023].
- Eiben, Á. E., 2021. *Robot Evolution: Ethical Concerns*. [Online]
Available at: <https://www.frontiersin.org/articles/10.3389/frobt.2021.744590/full>
[Accessed 16 April 2023].

Gellers, J. C., 2020. *Rights for Robots*. [Online]

Available at: <https://library.oapen.org/handle/20.500.12657/43332>

[Accessed 16 July 2023].

Geng Huang, L.-Y. H. ,. X. L., 2022. *Robot adoption and energy performance: Evidence from Chinese industrial firms*. [Online]

Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0140988322000214>

[Accessed 16 July 2023].

Gicoh, 2023. *Robotics Technology: Shaping the Future of Automation*. [Online]

Available at: <https://www.linkedin.com/pulse/robotics-technology-shaping-future-automation-gicoh/>

[Accessed 16 July 2023].

Graetz, G., 2015. *Robots at Work*. [Online]

Available at: <https://ideas.repec.org/p/cep/cepdps/dp1335.html>

[Accessed 2023].

Haidegger, T., 2013. *Applied ontologies and standards for service robots*. [Online]

Available at: <https://www.sciencedirect.com/science/article/abs/pii/S092188901300105X>

[Accessed 16 April 2023].

House, T. W., 2016. *Artificial Intelligence, Automation, and the Economy*. [Online]

Available at: <https://obamawhitehouse.archives.gov/sites/whitehouse.gov/files/documents/Artificial-Intelligence-Automation-Economy.PDF>

[Accessed 17 July 2023].

IMARC, 2023. *Logistics Robots Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028*. [Online]

Available at: <https://www.imarcgroup.com/logistics-robots-market>

[Accessed 17 July 2023].

Ishiguro, H., 2006. *The Uncanny Advantage of Using Androids in Social and Cognitive Science Research*. [Online]

Available at: <https://philpapers.org/rec/ISHTUA>

[Accessed 16 July 2023].

Ke Li, B. L., 2018. *How to promote energy efficiency through technological progress in China?*. [Online]

Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0360544217318960>

[Accessed 16 July 2023].

Mahadevan, J., 2017. *Performing interplay through intercultural simulations: Insights on tacit culture in a Taiwanese–German management team*. [Online]

Available at: <https://journals.sagepub.com/doi/abs/10.1177/1470595813507155>

[Accessed 16 July 2023].

MIn, W., 2018. *Smart Policies for Harnessing AI*. [Online]

Available at: <https://www.oecd-forum.org/users/68225-wonki-min/posts/38898-harnessing-ai-for-smart-policies>

[Accessed 17 July 2023].

Ning, H., Yin, R., Ullah, A. & Shi, F., 2021. *A Survey on Hybrid Human-Artificial Intelligence for Autonomous Driving*. [Online]

Available at: <https://ieeexplore.ieee.org/abstract/document/9423526>

[Accessed 16 July 2023].

Olatz De Miguel Lázaro, W. M. M. R. F. B. L. M. L., 2019. *An Approach for adapting a Cobot Workstation to Human Operator within a Deep Learning Camera*. [Online]

Available at: <https://ieeexplore.ieee.org/abstract/document/8972238>

[Accessed 16 July 2023].

Rai, R., 2023. *Logistics Robots Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028*. [Online]

Available at: <https://www.imarcgroup.com/logistics-robots-market/requestsampl>

[Accessed 16 July 2023].

Rajput, U., 2023. *Logistics Industry Embraces Technological Advancements to Enhance Efficiency and Sustainability*. [Online]

Available at: <https://www.linkedin.com/pulse/logistics-industry-embraces-technological-enhance-uday-rajput/>

[Accessed 16 July 2023].

Reilly, K., 2011. *From Automata to Automation: The Birth of the Robot in R.U.R. (Rossum's Universal Robots)*. [Online]

Available at: https://link.springer.com/chapter/10.1057/9780230347540_6

[Accessed 16 July 2023].

Roberts, S. T., 2016. *Digital refuse: Canadian garbage, commercial content moderation and the global circulation of social media's waste*. [Online]

Available at:

https://www.researchgate.net/publication/314091657_Digital_refuse_Canadian_garbage_commercial_content_moderation_and_the_global_circulation_of_social_media's_waste

[Accessed 17 July 2023].

Robinson, L., 2015. *Digital inequalities and why they matter*. [Online]

Available at: <https://www.tandfonline.com/doi/abs/10.1080/1369118X.2015.1012532>

[Accessed July 2023].

Sam Kriegman, D. B. M. L. a. J. B., 2020. *A scalable pipeline for designing reconfigurable organisms*. [Online]

Available at: <https://www.pnas.org/doi/abs/10.1073/pnas.1910837117>

[Accessed 16 July 2023].

Sherry Wasilow, J. B. T., 2019. *Artificial Intelligence, Robotics, Ethics, and the Military: A Canadian Perspective*. [Online]

Available at: <https://ojs.aaai.org/aimagazine/index.php/aimagazine/article/view/2848>

[Accessed 16 July 2023].

Sparrow, R., 2002. *The March of the robot dogs*. [Online]

Available at: <https://link.springer.com/article/10.1023/a:1021386708994>

[Accessed 17 July 2023].

Thomas Arnold, M. S., 2018. *The “big red button” is too late: an alternative model for the ethical evaluation of AI systems*. [Online]

Available at: <https://link.springer.com/article/10.1007/s10676-018-9447-7>

[Accessed 17 July 2023].

Torresen, J., 2018. *A Review of Future and Ethical Perspectives of Robotics and A*. [Online]

Available at: <https://www.frontiersin.org/articles/10.3389/frobt.2017.00075/full>

[Accessed 16 July 2023].

Tran Le Nguyen, T. T. H. D., 2019. *Artificial Intelligence in Healthcare: A New Technology Benefit for Both Patients and Doctors*. [Online]

Available at: <https://ieeexplore.ieee.org/abstract/document/8893884>

[Accessed 16 July 2023].

Wo Jae Lee a, H. W. H. Y. H. K. M. B. J. J. W. S., 2019. *Predictive Maintenance of Machine Tool Systems Using Artificial Intelligence Techniques Applied to Machine Condition Data*. [Online]

Available at: <https://www.sciencedirect.com/science/article/pii/S2212827118312988>

[Accessed 16 July 2023].

Wolfe, F., 2017. *How artificial intelligence will revolutionise the energy industry*. [Online]

Available at: <http://sitn.hms.harvard.edu/flash/2017/artificial-intelligence-will-revolutionize-energy-industry/>

[Accessed 2023].