

# Robotics in Healthcare

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**Abstract**— With the fast development within the Artificial Intelligence & Robotics Surgery, we have all the items of technology which is able to facilitate countries in tending and it's simply a matter of our time once this technology items are integrated to rework our approach of living. Robotics deals with programmed machines designed to try and do labour intensive work and to create their approach easier. In healthcare, like most other fields, the industry has adopted an increasing number of robotic systems that occupy a variety of functions. Robots are currently engaged in such tasks as patient monitoring and evaluation, medical supplies delivery, prescription fulfillment, and in the capacity of performing diagnostics and surgery. The scope of robotics in healthcare will take on a more practical role in the broad mission of providing care, particularly where service delivery gaps are present. The online survey was taken to attain the proposed hypothesis. With the help of quantitative analysis the proposed hypothesis is accepted.

**Keywords:** AI-Enabled Robotics, Exoskeletons, Surgical Robotics, Human-Robot Interaction, Care Robots

## I. INTRODUCTION

These days robots are extremely specialized machines utilized in a diversity of fields, significantly in industrial applications during which their speed and accuracy gift recognizable blessings. Within the surgical field, it had been not till the mid-1980s once surgeons utilize the thought of AI for the primary time with a device accustomed to perform the precise diagnostic test in operation.<sup>1</sup> Since then, makers have created efforts to improve the effectiveness and dependableness of their robotic systems. The first application of robotic-assisted surgery was within the neurosurgical field, However, robotic advancements in urogenital medicine, gynecology, medical specialty, and medical science are additional common thanks to fewer anatomical challenges. As an example, an outsized cavity wherever a robotic arm might be accustomed to assisting in spine surgery is nonexistent, and the surgical procedure involves delicate neural structures and approaches through slender surgical corridors wherever manipulation and area are each restricted. At the foremost basic level, 'healthcare AI' (medical robotics) is solely the application of robotics technology to aid to diagnose and treat malady or to correct, restore or modify a body operation or apart. AI for drugs and aid is taken into account the domain of systems able to perform coordinated mechatronic actions (force or movement exertions) on the premise of the process of data non-heritable through detector technology, with the aim to support the functioning of impaired people, medical interventions, care and rehabilitation of patients and additionally to support people in hindrance programs. Design/methodology/approach — following a quick introduction, this paper initially considers robotic surgery and

discusses a range of economic merchandise, applications, and up-to-date technological advances.

### A. Types of Robots which are used in HealthCare -

The health care business uses four sorts of robots to spice up this traditional normal of care, whereas additionally serving to humans to try to do things that they were not ready for in the past, or do things faster and with fewer errors. Listed below are the leading medical robots, as known by Globalist.

#### 1) Surgical Robots:

Major industrialist are increasing their R&D efforts within robotic surgical systems. The overall market is presently dominated by Intuitive Surgical, however, the landscape is quickly changing. The entrance of major producers like Johnson & Johnson and Medtronic is bolstering the med-tech surgical AI market. All firms supply robotic surgical systems with system-specific attachments, however, Intuitive has intrinsic chips to work out the utilization of their disposable accessories, and TransEnterix's attachments are reusable. The procedure volumes of robotic surgical procedures in the industry increases the attention so businesses are growing more further. This growth will be attributed to the rise in the adoption rates of robotic surgical systems globally.

#### 2) Exoskeletons:

Robots will aid recovery and assist with surgery. As an example, Cyberdyne's Hybrid helpful Limb (HAL) systems skeletal, that uses sensors placed on the skin to observe little electrical signals within the patient's body and respond with movement at the joint, are designed to help patients rehabilitate from conditions resulting in lower limb disorders, together with neural structure injuries and strokes. Such devices don't seem to be cheap—the monthly rental for a HAL suit is predicted to be 73,962.45 rupees and the worth will need to come back down as output scales up and element prices of things together with sensors, physics, and technology. The exoskeleton market is one of the quickest growing segments in AI. It includes bio-feedback waistcloth body part support for landing field and warehouse employees, which are already a standard sight in Japan. Advances in brain-machine property can impact the evolution of exoskeletons. The leading firms within the field are Cyberdyne, ReWalk AI, and Ekso engineering.

#### 3) Care Robots:

The number of robots used to give care and support to senior and disabled patients is presently terribly low, however, is predicted to extend considerably over a successive decade, notably in countries like Japan that is facing a foreseen inadequacy within the range of accessible caregivers. Initial use cases for these merchandises are comparatively straightforward, like serving to folks get into and out of bed, however, they're going to additional be known as upon to perform more complicated tasks, from reminding patients once to take medication and by providing emotional support and interaction for those lacking regular human contact. If

robots were ready to facilitate these straightforward repetitive tasks, it'd offer nurses longer to concentrate on personal patient care and making treatment plans. Merchandise just like the Robear Japanese, developed by analysis institute RIKEN and Sumitomo Riko, are already aiding patients and nurses in Japan.

#### 4) Hospital Robots:

Hospital Robots like Aethon's TUG autonomous mobile mechanism will be used to deliver medications, laboratory specimens, or different sensitive material inside the hospital's surroundings. TUG will navigate employing an intrinsic map And an array of onboard sensors. In addition, it uses Wi-Fi to speak with elevators, automatic doors, and fireplace alarms. Robots are designed to clean hospital devices and instruments.

## II. OBJECTIVES

Healthcare systems across the globe are getting progressively inundated attributable to increasing populations, significantly the growing old population. artificial intelligence can give solutions that might relieve these raised burdens through the event of exoskeletons to ease the strain on caregivers and autonomous mechanical man care robots designed to move directly with patients. no matter you're thinking that of artificial intelligence, they're inflicting a revolution. software system and process technology, sensors, industrial drones, autonomous vehicles, and developments around cooperative robots (co-bots) area unit all pushing artificial intelligence capabilities to new heights and driving uptake of various client, recreation, service, and industrial robots. computing in tending refers to the employment of complicated algorithms designed to perform such tasks in an automatic fashion. once researchers, doctors and scientists inject information into computers, the new engineered algorithms will review, interpret and even recommend solutions to complicated medical issues. If the Robotics surgery is going to be the future of the medical surgery then it should maintain the faith and hopes of human in the hands of Robots because the upcoming age will be of Robots.

The objectives will be achieved by examining through survey analysis. Hence, we tend to gift hypothesis as Hypothesis - If the Robots are integrated with Artificial intelligence enabled chip then the behaviours, emotions, observations of Robots will increase because the A.I will help in understanding the logic and reasons of human behaviour.

## III. LITERATURE REVIEW

[1] Robotics is one of all the rising, difficult, developing, and innovative fields of analysis among scientists. With the arrival of the web of Things (IoT), robots are integrated as a 'thing'. It indicates the long-run advantages of soul in the health care sector, medical emergencies, e-health, etc. victimization of AI and IoT. [2] This paper presents the analysis of a number of the prime aspects regarding artificial intelligence in mental attention, that refers to the study of robots .We can propose a number of the foremost necessary capabilities and technical achievements of medical and health-care artificial intelligence required to enhance human health and well-being. [3] Robotic technologies have contributed to boost the physical limits of human employees

in terms of repeatability, safety, durability, and accuracy in several industrial factories as well as those of the car, shopper natural philosophy and construction industries. [4] This paper aims to review of the utilization of robots in 2 tending applications: surgery and medical specialty. Afterwards it discusses concerning robotic surgery and choice of economic merchandise, applications and up to date technological advances. [5] Surgeons play a serious role within the neurosurgical field, however robotic systems challenge the present establishment. Current analysis and development groups specialise in robotic-assisted surgery and minimally invasive surgery. [6] The author argues that next to moral analysis, classic technology assessment, and philosophical speculation so we'd like varieties of reflection, dialogue, and experiment that come back, quite virtually, a lot of nearer to innovation practices and contexts of use. [7] The authors mentioned that Robots are wont to facilitate treat individuals with syndrome, dementia, and different psychological feature impairments, have helped to produce friendship to individuals experiencing loneliness, and are wont to facilitate improve however individuals with disabilities area unit treated by clinicians. [8] The Author Asked the question if trust is applicable to robots and conjointly discusses completely different approaches to trust, and analyses some preconditions for trust. [9] Future model of a care golem with integrated affectional capabilities. The paper describes a number of the potential moral issues arising from such a technology. [10] The author of this text reviewed this expertise of robotic pancreaticoduodenectomy rumoured within the international literature evaluating its safety, feasibility, short and future outcomes. [11] As the authors had reviewed during this paper that the present and therefore the potential applications of automaton AI in care mistreatment completely different fields AI like ARMAR III, Cody, PR2, RIBA, ASIMO, ROSE. Also, the Applications of automaton AI in tele-healthcare, pain relief and aging population. [12] The author believed that AI can become Associate in Nursing integral element of surgery within the future, exchange examination and open approaches in many alternative ways that. However, the transition ought to be rigorously monitored, risks and advantages strictly evaluated, and analytic thinking performed to see a secure role for AI in every stage of its evolution and in several clinical applications. [13] Robots are getting a vital thanks to deliver health care, and temperament is significant to understanding their effectiveness. The authors have conducted a review during which the paper presents the results of that systematic literature review as a result of the automatons were lacking systematic overarching understanding of temperament in health care human robot interaction (H-HRI). [14] During this study, the authors discussed that a wireless net based mostly automaton is meant for physicians to speak with the patients at a distance. an easy form of automaton with 3 motors for driving 3 all-direction wheels is employed because the basic structure. It additionally contains four supersonic transducers, one RFID reader, one web-based camera, one highly sensitive mike, associate degreed an IR-based positioning device

#### IV. METHODOLOGY

The robots which are used in healthcare requires more and informative data as well as useful data also. If robots are integrated with AI enabled chips then it will be very usefull in surgery. It will be give better options since quantitative data is used to achieve that aim. Now, For understanding the logic behind the emotions, behaviour of humans it will play an essential and crucial part.

In this paper, the sampling method was used for an online survey form. The survey form was created using Google form. The survey link was circulated in the social media platform. The questionnaire in the survey form was designed in such a way to test the proposed objective. The survey was collected from Mumbai city in India. There were 24 people who take part in the survey. Among them 65% were male and 35% were females. Chi-square test was applied to analyse the quantitative data because it is a suitable method to attain the proposed objectives.

#### V. EXPERIMENT

The survey is tested using the Chi-square test to check the proposed hypothesis. The Chi-square test is used to analyze the data in a statistical way. The formula of Chi-square test is  $\chi^2 = \sum(O_i - E_i)^2/E_i$ , where  $O_i$  is the observed value and  $E_i$  is the expected value. The outcome of the test is  $X^2$  calculated as 10.8862 and  $x^2$  tabulated as 3.841 at significance level 0.05 Since  $x^2$  tabulated <  $X^2$  calculated here, the null hypothesis is rejected i.e. Robots integrated with AI chips are able to understand the logic behind the emotions, and behavior of humans is rejected. By this scenario [as shown in Fig 2] It is accepted that Robots need to be integrated with AI chips to understand the logic behind the emotions and behavior of humans.

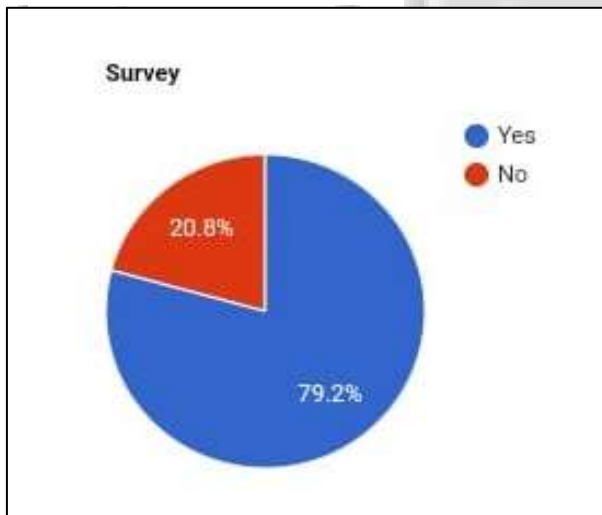


Fig. 1: Pie chart representation

Doctor and common people responses on two parameters i.e Robots needs to integrate with AI to perform better medical treatments. i.e. Yes/No

#### VI. RESULT

From the experiment, it is verified that Robots have to integrate with AI to perform better in medical treatment. The survey found that even inside an operating theater, respondents would be willing for a robot to perform a minor

surgical treatment rather than a doctor, if studies showed that they might higher than a doctor, By applying the Chi-square test on quantitative data our projected hypothesis is accepted. Additionally, from the analysis, it is realized that doctors are appropriate to use Robots integrated with AI when the doctor finds it is difficult to make a decision associated with some operations and for a few recommendations associated with the patient's problem.

#### VII. CONCLUSION

The majority of the doctors think that currently, the robots which are used for assisted surgery are yet to make better decisions. So according to the experiment, it is concluded that Doctors want to enhance it by integrating AI with robots. Nowadays, the requirement for more doctors is increasing day by day, so using robots that are suitable for their specific work is also increasing. Because AI integrated with robots, the chances of a successful operation are going to increase. The use of robotic systems in surgical operations might facilitate increase surgical accuracy, and permit surgeons to perform a lot of sophisticated operations. However, our current is robotic technology is proscribed due partially to anatomical challenges, therefore, different specialty areas have grownup a lot quicker than surgical operation. Many technical challenges, together with style problems and restricted haptic feedback, have stalled AI within the surgical operation.

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