

INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

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- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19-22 June.

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ROBOTICS IN NURSING**DR. JANET. J****PROFESSOR****SI-MET COLLEGE OF NURSING
MALAMPUZHA, PALAKKAD, KERALA****ABSTRACT**

Advances in technology just over the horizon will permit an individual to consult a computer much as one now consults a physician for diagnosis, recommendations, instructions, and treatment. Only a step beyond this is the development of robots who can do a better surgical job than a human being. What is missing from this scenario? Tender loving care. That is the nurse's job, and it is something that computers cannot do because it involves feelings and human communication that are beyond mere technology. Consequently, nurses will be needed long after physicians have passed into limbo. The practical lesson of this look into the future is that, although nurses certainly must remain in touch with the cutting edge of technology, their primary purpose will be to retain and sharpen the skills that Florence Nightingale introduced. Human response will never be replaced by technology, and the unchanging need for the nurses' caring function will assure their future. Nurses want to make patients feel human again, and not like a disease. Most doctors and nurses just don't have time to talk to patients anymore. The lack of communication and lack of empathy from care providers has frustrated many patients and has led to numerous complaints. The robots are highly skilled and once programmed with a diagnosis, they will be able to explain all details regarding the patient's condition and offer support.

KEYWORDS

robotics, nursing.

INTRODUCTION

There is a lot of demands in nursing profession and the world is already facing a shortage in the nursing industry. As per the US census Bureau, the number of seniors and the elderly is going to increase and soon it will double than the normal younger population. This phenomenon may set off more activity in the health and medical field creating a severe dearth of medical professionals. The world is not prepared for such a circumstance and there is very little anyone can do about it. Nurses are required in several fields of the hospital industry like for hospital care, personal care, old age homes, psychiatric nursing care, Child health nursing, community health nursing care and many more. Given the current scenario, there is already a shortage of nurses and this shortage is only likely to increase further. Will robotics help to come up with solutions for the shortage of nurses in the health industry is one question that is being put by the medical professionals. It is difficult to say because robots can do certain kind of jobs well but they definitely are not yet prepared to take over the role of a nurse. However, the robotics technology can be used to ease the responsibilities of a nurse. Robotic nurses hold the promise of becoming more of a reality now than science fiction. Imagine having a robot around the house to do all your chores, administer medicine, and do all your checkups without you having to step out of your house at all. This is what robotic nurses or nurse bots are programmed to do, and the rate at which research is underway on this project, robotic nurses may soon become a common household feature for all those who can afford it. Robots are being used actively in medical and welfare industry because of the shortage of manpower in this industry. The main reason for this kind of deficit is the falling birth rate and the increasing aging population. The deficit cannot be filled and it is only going to increase. In the medical industry all over the world, there is a severe dearth of nurses. This dearth is being faced to a much higher level by some of the developed nations. Nurses are hard to find and hospitals that are always running full house most of the time need people in this category to a large extent. Robots are the best way to fill this gap and increase efficiency at the same time. There are several innovative methods through which the robots can take the place of a nurse.

DEFINITIONS OF ROBOT

The Ministry of Economy, Trade and Industry (METI) defines a robot as an intelligent mechanical system that incorporates three technological elements: sensing, intelligence and control, and drive.

"A reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through various programmed motions for the performance of a variety of task." Robot Institute of America, 1979.

"An automatic device that performs functions normally ascribed to humans or a machine in the form of a human." Webster's Dictionary

ROBOT

Robots are further categorized by their use into industrial robots, which are used in factories, and service robots, which are used in the areas of medical care and welfare, livelihood support, and amusement. Anticipating a reduction in Japan's workforce due to the declining birthrate and aging population, and the improvement of the quality of products and services, METI is implementing various measures for the development of robot technologies of the next generation and for the creation of new industry.

WHAT IS ROBOTICS?

Robotics is a field of engineering that deal with design and application of robots and the use of computer for their manipulation and processing. Robots are used in industries for speeding up the manufacturing process. They are also used in the field of nuclear science, sea-exploration, servicing of transmission electric signals, designing of bio-medical equipments etc. Robotics requires the application of computer integrated manufacturing, mechanical engineering, electrical engineering, biological mechanics, software engineering and the like. Robots have come a long way since the day the first robot was built in 1927. Nowadays, these machines are used as surgery robots, service robots, and military robots. It is startling to learn that scientists are now trying to make robots human-like by infusing emotions and expressions onto them. The word robot comes from the Czech word 'roboto' or 'labour'. A robot is a machine/servant/slave. The word android derives from the ancient Greek for 'man of the species'. The terms "robot" (a "mechanical" being) and cyborg (a being that is partly organic and partly mechanical), a cyborg is a combo of artificial parts in an organic body. We have cyborgs among us even as we speak. We have people with artificial hearing devices that hook directly to their brain. We have people with pacemakers to keep their hearts beating. We have people with artificial heart valves to allow the flow of blood. We have some artificial limbs that hook up to a person's nervous system and actually move when the person "thinks" about it. So, you don't have to go to the movies to see cyborgs. Chances are you walked by a cyborg a few minutes ago. The word "android" has been used in literature and other media to denote several different kinds of artificially constructed beings:

- A robot that closely resembles a human
- An artificially or synthetically created being that closely resembles a human; also referred to in many series (mostly anime) as Bio Android.
- Any machine that mimics a human.

An Android to be a human-like robot, whereas a Robot can be any sort of shape or form - for example, there are robots which are used in car manufacture but they look nothing like people - usually they are long mechanical arms that can perform complex tasks, but don't have any legs, body, head etc. Robots can also

be round discs which run around the floor too. The robot, that can also recognise faces and voices and respond to up to 30 spoken commands, may be seen in hospitals and retirement homes within three years.

INSTITUTES IN INDIA OFFERING COURSES IN ROBOTICS

Indian Institute of Technology Kanpur, Uttar Pradesh, National Institute of Technology, the University of Hyderabad- M.Tech in Artificial Intelligence and Robotics, Jadavpur University, Kolkata, Birla Institute of Technology and Science, Pilani, Sri Sathya Sai Institute of Higher Learning, Prasanthinilayam, Tamil Nadu- M.Tech, PSG College of Technology, Coimbatore (Tamil Nadu) Mechanical (Robotics as an elective subject) and Innobuzz Knowledge Solutions, Pitampura, New Delhi.

DEVELOPMENT AND HISTORY OF ROBOTICS

A robot is a self controlled device that is built using electronic, electrical and mechanical units. The robot is designed to carry out a specific set of instructions that it is programmed for regularly. Robots can do the same task several times without getting bored with it and getting tired of it. Bots were initially used in industries to handle radioactive material because they were harmful to people. Here is a brief history and the time line of robots. Robots mainly gained popularity in the 20th century and after that, the development in this segment of science was rapid. What was called a science fiction actually turned into reality?!!!

- In early 270 B.C., a Greek engineer called Ctesibus made small robots with water clocks and organs.
- In 1818, Frankenstein became popular, a character created by Mary Shelley. He was actually an evil robot.
- Robots have come a long way since the day the first robot was built in 1927. Nowadays, these machines are used as surgery robots, service robots, and military robots. It is startling to learn that scientists are now trying to make robots human-like by infusing emotions and expressions onto them.
- In 1941, Isaac Asimov used the word robot to describe the automatic device. Isaac Asimov also created the three laws for robots which involved the facts that robots should not be designed to harm humans and they should be primarily made to obey orders given by humans.
- In 1956, two people named George Devol and Joseph Engelberger found the world's first robot company.
- In 1959, MIT developed a lab based robot which worked on a computer assisted model.
- In 1961, the first robot was launched successfully by General Motors in New Jersey.

After that the concept of robots has been consistently developing and today we have robots that can act as house maids and servants.

ADVANTAGES OF ROBOTICS

Robotics is actually not a new invention but it has existed ever since there have been puppets and mechanized puppets. Initially when robots were being made, they had limited functionality and were mostly used by the toy industry. However, the concepts has been developed to an extent where we have human-like robots today performing advanced functions. The usage of robots is being contemplated by several industries including the medical and hospital industry. Robotics is being used widely by electronic, shipment, automotive and aircraft industries by large. They are used to automatically assemble microchips and other advanced features in gadgets and vehicles. However, in the hospital industry robotics is more dependants on humans for operability.

WHAT ARE ADVANTAGES OF ROBOTICS TO HUMANS?

There are several advantages of robotics for human beings. They can perform tasks more accurately and the chances of error are minimized to a great extent. They can do routine jobs with the closest accuracy, speed and efficiency. Robots can be controlled by humans and computers. They can carry out a set of instructions without any faults. The error-free nature of robots is valuable to many industries like aircraft and machine assembly units. Professions that are hazardous and harmful to human beings like chemical exposure and nuclear plant exposure can actually be mechanized and robots can be used instead. Heavy industry work which is harmful for the physical strength of humans can also be mechanized using robots. Robots can perform a task of 10 humans at one time in the same amount of time. Assistive devices that are being made using the robotics technology can empower the disabled people and make them less dependent. That is one area of application where the medical industry can get some breathing space. Assistive devices are also helping people with cognitive disorders lead an independent life. Nurses are required in many areas like personal care to hospital care. Robots are doing several things today like helping people to walk, bathe, groom, recreation, and much more. So robots are efficient enough to handle a nurse's functionality also. Once the baby boomer generation takes full control, then the demand for robots is also going to go up tremendously. A robot will be required then to take care of several daily needs of patients like feeding and grooming. Also, the robots can be controlled by the user which is an advantage to the user over a nurse actually.

ROLE OF ROBOTIC NURSES

Though the name suggests otherwise, robotic nurses are not meant to be a substitute for professional nurses, but are simply meant to add to the number of caregivers available. This technology is developed keeping in mind the care required by elderly people and those suffering from mobility issues on a daily basis. With the improvement in healthcare and medical services, the average life span of individuals is increasing, and this demographic shift calls for an improvement and expansion of the present care giving force struggling to meet the demands of society. There has to be a solution that suits all- proper care provided to those who need it without the extra burden on healthcare. With the rising cost of healthcare, the thought of having robotic nurses in homes and hospitals is both an exciting and a comforting proposition.

THE EXPECTED DUTIES THAT ROBOTIC NURSES ARE BEING TRAINED TO PERFORM INCLUDE:

- Live in the homes of elderly people as well as Chronically sick people and help with chores like opening the refrigerator or other appliances, and fetching small objects for them.
- Reminding patients to take their medicines, visit the doctor, or even take their meals on time.
- Reducing need for contact with doctors by connecting them with professional caregivers via the internet provide much needed social interaction.

ROBOTS BECOME NURSES' VALUABLE ASSISTANTS: RESEARCH REVIEW

Being a Nurse Let's be clear about one thing: Robots will never replace nurses. Even the most optimistic roboticists recognize that no combination of metallic parts, microchips, and binary files could ever replace the empathetic touch or clinical intuition of a human nurse. But researchers who believe that R2-D2 and C-3PO of "Star Wars" fame and the rogue humanoids in the movie "I, Robot" are more than just fantasy say robotic devices will one day help nurses work more efficiently and may even help them remain in the profession as they age.

"Robots are going to be your friend," says Charlie Kemp, PhD, assistant professor in the department of biomedical engineering at Georgia Tech and Emory University and director of the Center for Healthcare Robotics in Atlanta. "There is an enormous opportunity for robots in health care, with many ways for them to increase efficiency and quality across the board. Helping nurses do their job is one of those ways"(2008). Robots have difficulty operating in complex and unpredictable work environments such as hospitals. Current research focuses on designing robots that will do many of the routine and often mundane — but essential — tasks associated with nursing care, such as feeding and lifting patients. Future robots may one day be able to take and monitor patients' vital signs instead of a nurse, but they are far from having a nurse's ability to synthesize the information, clinically assess what it means, and physically take action. Instead of acting on their own, robots will serve as assistants and enable nurses to lend their expertise to remote areas without physically traveling to those locations. Already, courier robots resembling small, mobile cabinets or carts are ferrying linens, medications, laboratory samples, supplies, and other equipment

throughout hospitals without bumping into patients, visitors, or healthcare staff. They go by the names TUG, RoboCart, and HelpMate. The U.S. Department of Defense approved a contract to develop a multitasking robotic nursing assistant (RNAs). The robot would be able to lift combat-wounded soldiers out of bed, deliver supplies, and offer telepresence capabilities for off-site healthcare staff. "The nurse would guide the robot and tell it when to start and stop," says Aaron Edsinger, PhD, a roboticist working with the companies designing the Phase I prototype for the Army. Other researchers are exploring whether robots can help people who have had strokes perform their physical therapy more effectively to improve their muscle strength and flexibility.

The arena in which healthcare robots have been most successful thus far is the OR and includes the use of the well-known DaVinci surgical robotic system. Robotics help surgeons perform laparoscopic and thoracoscopic surgeries and, in recent years. The advantages of using robots in surgeries includes decreased pain, faster recovery, shorter hospital stays, fewer complications, and reduced costs.

Researcher Judith T. Matthews, RN, PhD, a nursing professor at the University of Pittsburgh, is determining whether robots can make life easier for residents in long-term care facilities and the elderly and disabled who are living at home.

"This is about robotic assistive technology to help older adults and persons with disabilities manage their everyday lives," says Matthews. "That's a role nurses typically don't play. Robots, may help offset a worsening shortage of nurses and nurses aides projected for long-term care. At the Center for Healthcare Robotics in Atlanta, Kemp is researching how robots can help people with their activities of daily living, from picking up dropped objects to feeding them to giving them a sponge bath.

The inspiration for the robot came from helper monkeys and service dogs who care for people with spinal cord injuries.

Debi Sampsel, RN, MSN, executive director of the Nursing Institute of West Central Ohio, believes robots have a place in health care and that the futuristic blend of nursing and technology offers a solution to today's nursing shortage. Sampsel says aging and physically impaired nurses can extend their careers by partnering with remote presence robots, such as the RP-7 from In Touch Health that is already being used by physicians. The RP-7 is a wireless, mobile robot whose "head" is a flat-screen monitor. It operates under the direct control of a nurse or other healthcare provider seated at a control station and using a keyboard and joy stick. It moves undeterred, allowing the nurse to interact from anywhere with patients, family members, students, and hospital staff. The healthcare provider is able to see the patient and the patient is able to see the healthcare professional's face projected onto the monitor, which is positioned where the robot's head would be. "Remote presence robots hold out hope for extending career opportunities for nurses who might otherwise leave the profession," says Sampsel, who has spent years exploring potential solutions to the aging workforce.

In remote robot form, the faculty member was able to move about the skills lab to view the actions of the students, and also robot can able to debrief the class and talk to individual students who needed further assistance. Robots at this point can't think like a person, and it could be a very long time before they do but they're going to eventually be better than science fiction because they're going to lend real value to nursing."

FUTURE OF ROBOTIC NURSES

Scientists predict a surge of robotic nurses by the year 2010. A few robots were already introduced to be tested to see how they are better in helping patients with mobility issues. For example, the robot El-E, developed by the Center for Healthcare Robotics in the Health Systems Institute at the Georgia Institute of Technology and Emory University, is designed to aid people with everyday tasks such as fetching small objects around the house. Pearl Nurse bot developed in collaboration by four schools in the United States- University of Michigan, Pittsburgh, Carnegie Mellon and Stanford is undergoing field testing at the Longwood Retirement Community in Oakmont, Pa. RIBA, developed by researchers at Japan's Institute of Physical and Chemical Research it is designed to help nurses lift and carry patients weighing up to 61 Kgs. Now, robot nurse to give patients sponge baths. Washington. Nov. 14, Scientist have developed a robot that can help patients maintains personal hygiene. The researcher at the Georgia Tech's Health care Robotics Lab have developed the robo named Cody reports live science. Cody has demonstrated its ability to clean a patients arm and legs. It has limb with reduced stiffness in case of accidental bumping, and is designed to extra a very low amount of pressure while sponging down a patient. There also stop button ready for humans to press just in case. The robots would be fitted with sensors and cameras allowing them to avoid collisions while travelling through wards and corridors. High-speed lanes could allow them to move from place to place quickly. The robots would also employ face and voice recognition technology to communicate with patients and spot un authorized visitors. "The human-robot interaction will be tricky, as the robots will have to be able to deal with people with different injuries and disabilities as well as the elderly and seriously ill patients. They could also distribute medicines and even monitor the temperature of patients remotely with laser thermometers. Working in teams, the intelligent robots will be able to communicate with each other and co-ordinate their duties (2007).

NURSING IN 2020

Here are some of the technologies that have changed the nursing career in the past century.

1. Electronic IV monitors
2. Portable defibrillators
3. Computer stations
4. Hands-free communication devices including remote call badges
5. Portable IT devices
6. Drug management technology to regulate dosage of medications.

Yet with all these advances, there is an nursing shortage in many parts of the world. By the year 2020, it is estimated there will be a shortage of 8,00,000 nurses. (Buerhaus, JAMA, 2000). Some robots gives command, taking food to patients and gives comment after entering the elevator for the particular floor. According to the new technology Robot nurses could be in hospitals by 2020 (Warwick University Engineering Dept, UK).

DISADVANTAGES OF THE NURSE ROBOTS

1. Robots can't respond properly at the times of emergency and danger
2. They are expensive
3. They have limited duties. They can do what have been ordered to do
4. Human touch should not be substitute with machine
5. Demands electrical charging system
6. Patient may feel fear and anxiety
7. Small scale hospital could not be afford
8. Robots not having kindness to the patients
9. Ordered nursing procedure only it will be carrying out

CONCLUSION

To conclude Mahatma Gandhi said that robots are welcome as long as they help human beings to be more productive and creative, but they should not make human beings their slaves. Robots are pleasant for the work of human nurses, but whether is it show the intimacy, kindness, Dedication and love as real nurse towards our clients?!... Nurses are obviously the cream of humanity. So if robots can do the work of the finest humans, where will it all end? Nurses will be replaced by evil robots or Noble robots - Nurses as well as Student nurses have to be warned. **Is it Trend or Tragedy in Nursing ???**

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