Chapter 1:

INTRODUCTION

The Internet of things (IoT) is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware (such as sensors), these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled.

In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", covering devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers.

The concept of a network of smart devices was discussed as early as 1982, with a modified Coke vending machine at Carnegie Mellon University becoming the first Internet-connected appliance, able to report its inventory and whether newly loaded drinks were cold or not.[7] Mark Weiser's 1991 paper on ubiquitous computing, "The Computer of the 21st Century", as well as academic venues such as UbiComp and PerCom produced the contemporary vision of the IoT. In 1994, Reza Raji described the concept in *IEEE Spectrum* as "[moving] small packets of data to a large set of nodes, so as to integrate and automate everything from home appliances to entire factories". Between 1993 and 1997, several companies proposed solutions like Microsoft's at Work or Novell's NEST. The field gained momentum when Bill Joy envisioned device-to-device communication as a part of his "Six Webs" framework, presented at the World Economic Forum at Davos in 1999.

The term "Internet of things" was likely coined by Kevin Ashton of Procter & Gamble, later MIT's Auto-ID Center, in 1999, though he prefers the phrase "Internet *for* things". At that point, he viewed Radio-frequency identification (RFID) as essential to the Internet of things, which would allow computers to manage all individual things.

A research article mentioning the Internet of Things was submitted to the conference for Nordic Researchers in Norway, in June 2002, which was preceded by an article published in Finnish in January 2002. The implementation described there was developed by Kary Främling and his team at Helsinki University of Technology and more closely matches the modern one, i.e. an information system infrastructure for implementing smart, connected objects.

Defining the Internet of things as "simply the point in time when more 'things or objects' were connected to the Internet than people", Cisco Systems estimated that the IoT was "born" between 2008 and 2009, with the things/people ratio growing from 0.08 in 2003 to 1.84 in 2010.

The Internet of Medical Things (also called the internet of health things) is an application of the IoT for medical and health related purposes, data collection and analysis for research, and monitoring. This 'Smart Healthcare', as it is also called, led to the creation of a digitized healthcare system, connecting available medical resources and healthcare services.

IoT devices can be used to enable remote health monitoring and emergency notification systems. These health monitoring devices can range from blood pressure and heart rate monitors to advanced devices capable of monitoring specialized implants, such as pacemakers, Fitbit electronic wristbands, or advanced hearing aids.[46] Some hospitals have begun implementing "smart beds" that can detect when they are occupied and when a patient is attempting to get up. It can also adjust itself to ensure appropriate pressure and support is applied to the patient without the manual interaction of nurses. A 2015 Goldman Sachs report indicated that healthcare IoT devices "can save the United States more than $300 billion in annual healthcare expenditures by increasing revenue and decreasing cost." Moreover, the use of mobile devices to support medical follow-up led to the creation of 'm-health', used "to analyze, capture, transmit and store health statistics from multiple resources, including sensors and other biomedical acquisition systems".

Chapter 2:

Club Foot

Clubfoot is a birth defect where one or both feet are rotated inwards and downwards.

The affected foot, calf and leg may be smaller than the other. In about half of those affected, both feet are involved. Most cases are not associated with other problems. Without treatment, people walk on the sides of their feet, which causes problems with walking.

Clubfoot occurs in about 1 in 1,000 new-borns. The condition is less common among Chinese and more common among Maoripeople..

Males are affected about twice as often as females. Treatment can be carried out by a range of healthcare providers and can generally be achieved in the developing world with few resources.

The definition of the Internet of things has evolved due to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems.

There are many hypotheses about how clubfoot develops. Some hypothesis include: environmental factors, genetics, or a combination of both. Research has not yet pinpointed the root cause, but many findings agree that "it is likely there is more than one different cause and at least in some cases the phenotype may occur as a result of a threshold effect of different factors acting together."

Some researchers hypothesize, from the early development stages of humans, that clubfoot is formed by a malfunction during gestation. Early amniocentesis (11–13 wks) is believed to increase the rate of clubfoot because there is an increase in potential amniotic leakage from the procedure. Underdevelopment of the bones and muscles of the embryonic foot may be another underlying cause. In the early 1900s, it was thought that constriction of the foot by the uterus contributed to the occurrence of clubfoot.

Underdevelopment of the bones also affects the muscles and tissues of the foot. Abnormality in the connective tissue causes "the presence of increased fibrous tissue in muscles, fascia, ligaments and tendon sheaths".

Quick Summary

A variety of useful human-computer interaction systems can be designed if they are such that able to identify a human's attribute such as gender. The system can be made more human-like and respond correctly. A most simple scenario would be an intelligent robot that will interact with a human, it would require some details about gender to address the human appropriately (e.g. as Mr. or Miss).

Treatment is usually with some combination of the Ponseti or French methods. The Ponseti method includes the following: casting together with manipulation, cutting the Achilles tendon, and bracing. The Ponseti method has been found to be effective in correcting the problem in those under the age of two. The French method which involves realignment and taping of the foot is often effective but requires a lot of effort by caregivers. Another technique known as Kite does not appear as good. In about 20% of cases, further surgery is required.

Chapter 3:

Signs, symptoms and Causes

In clubfoot, one or both feet are rotated inwards and downwards.

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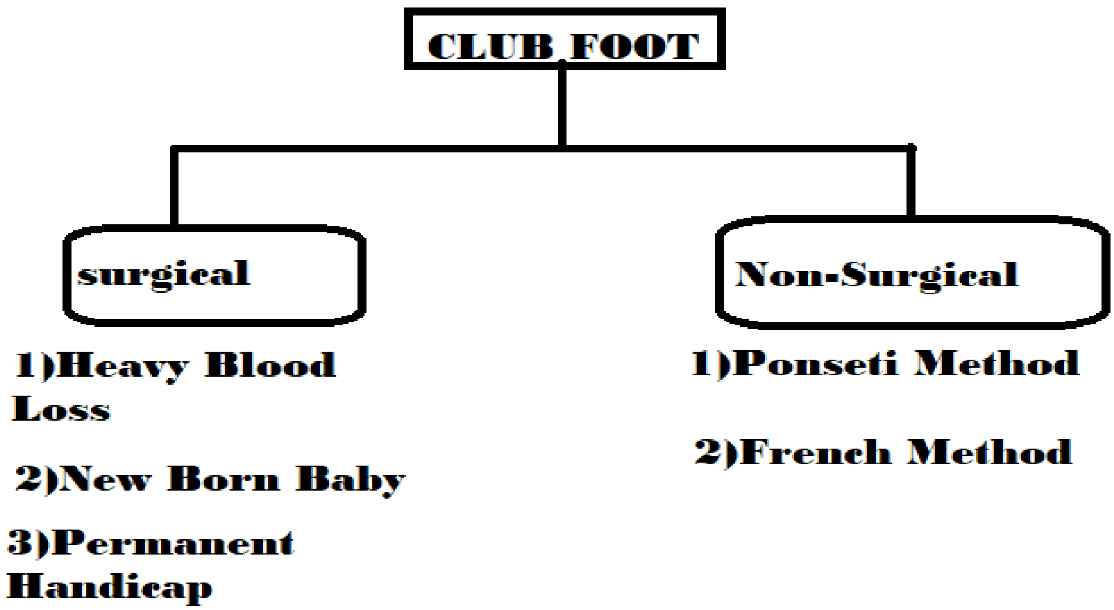
Initial Method Of Treatment:



Method Of Treatment:

Initial treatment is most often with the Ponseti method. This involves moving the foot into an improved position followed by casting, which is repeated at weekly intervals. Once the inward bending is improved, the Achilles tendon is often cut, and braces are worn until the age of four. Initially, the brace is worn nearly continuously and then just at night. In about 20% of cases, further surgery is required.

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Chapter 4:

Ponseti method

Using the Ponseti method, the foot deformity is corrected in stages.

These stages are as follows: manipulating the foot to an improved position and then holding it with a long leg cast, then removing the cast after a week, and then manipulating the foot again.

The foot position usually improves over a course of 4–6 casts. The amount of casts varies from person to person to address each individual's characteristic needs.

The Ponseti method is a manipulative technique that corrects congenital clubfoot without invasive surgery. It was developed by Ignacio V. Ponseti of the University of Iowa Hospitals and Clinics, USA in the 1950s, and was repopularized in 2000 by John Herzenberg in the USA and Europe and in Africa by NHS surgeon Steve Mannion. It is a standard treatment for club foot.

Ponseti treatment was introduced in UK in the late 1990s and widely popularized around the country by NHS physiotherapist Steve Wildon. The manipulative treatment of clubfootdeformity is based on the inherent properties of the connective tissue, cartilage, and bone, which respond to the proper mechanical stimuli created by the gradual reduction of the deformity. The ligaments, joint capsules, and tendons are stretched under gentle manipulations. A plaster cast is applied after each manipulation to retain the degree of correction and soften the ligaments. The displaced bones are thus gradually brought into the correct alignment with their joint surfaces progressively remodeled yet maintaining congruency. After two months of manipulation and casting the foot appears slightly over-corrected. After a few weeks in splints however, the foot looks normal.

Proper foot manipulations require a thorough understanding of the anatomy and kinematics of the normal foot and of the deviations of the tarsal bones in the clubfoot. Poorly conducted manipulations will further complicate the clubfoot deformity. The non-operative treatment will succeed better if it is started a few days or weeks after birth and if the podiatrist understands the nature of the deformity and possesses manipulative skill and expertise in plaster-cast applications.

The Ponseti's technique is painless, fast, cost-effective and successful in almost 100% of all congenital clubfoot cases. The Ponseti method is endorsed and supported by World Health Organization National Institutes of Health, American Academy of Orthopedic Surgeons, Pediatric Orthopedic Society of North America, European Pediatric Orthopedic Society, CURE International, STEPS Charity UK, STEPS Charity South Africa, and A Leg to Stand On (India).

Chapter 5:

French method

The French method for treatment of clubfoot is a conservative method of treatment of a newborn which requires daily physical therapy for the first two months. The goal of this treatment is to avoid future need of surgery, but the success rate varies and after release surgery may still be necessary.

The treatment includes daily manipulations of the feet along with stretching of the feet, followed by taping in order to maintain the range of motion gains achieved at the end of each session. The French method differs from the Ponseti method in that the taping techniques allow some motion in the feet. Another focus is to strengthen the peroneal muscles which is thought to contribute towards long-term correction.

After the two month mark physical therapy sessions can be weaned down to three times per week instead of daily until the child reaches six months old. Parents are required to continue on with home exercises and night splinting even after the program has achieved proper foot correction in order to maintain the correction. The Ponseti method is generally preferred.

Chapter 6:

Surgery

If non-operative treatments are unsuccessful or achieve incomplete correction of the deformity, surgery is sometimes needed. Surgery was more common prior to the widespread acceptance of the Ponseti Method. The extent of surgery depends on the severity of the deformity. Usually, surgery is done at 9 to 12 months of age and the goal is to correct all the components of the clubfoot deformity at the time of surgery.

Surgery leaves residual scar tissue and typically there is more stiffness and weakness than with nonsurgical treatment. As the foot grows, there is potential for asymmetric growth that can result in recurrence of foot deformity that can affect the forefoot, midfoot, or hindfoot. Many patients do fine, but some require orthotics or additional surgeries. Long-term studies of adults with post-surgical clubfeet, especially those needing multiple surgeries, show that they may not fare as well in the long term, according to Dobbs.

Some patients may require additional surgeries as they age, though there is some dispute as to the effectiveness of such surgeries, in light of the prevalence of scar tissue present from earlier surgeries.

For feet with the typical components of deformity (cavus, forefoot adductus, hindfoot varus, and ankle equinus), the typical procedure is a Posteromedial Release (PMR) surgery. This is done through an incision across the medial side of the foot and ankle, that extends posteriorly, and sometimes around to the lateral side of the foot. In this procedure, it is typically necessary to release (cut) or lengthen the plantar fascia, several tendons, and joint capsules/ligaments. Typically, the important structures are exposed and then sequentially released until the foot can be brought to an appropriate plantigrade position. Specifically, it is important to bring the ankle to neutral, the heel into neutral, the midfoot aligned with the hindfoot (navicula aligned with the talus, and the cuboid aligned with the calcaneus). Once these joints can be aligned, thin wires are usually placed across these joints to hold them in the corrected position. These wires are temporary and left out through the skin for removal after 3–4 weeks. Once the joints are aligned, tendons (typically the Achilles, posterior tibialis, and flexor halluces longus) are repaired at an appropriate length. The incision (or incisions) are closed with dissolvable sutures. The foot is then casted in the corrected position for

6–8 weeks. It is common to do a cast change with anesthesia after 3–4 weeks, so that pins can be removed and a mold can be made to fabricate a custom AFO brace. The new cast is left in place until the AFO is available. When the cast is removed, the AFO is worn to prevent the foot from returning to the old position.

For feet with partial correction of deformity with non-operative treatment, surgery may be less extensive and may involve only the posterior part of the foot and ankle. This might be called a posterior release. This is done through a smaller incision and may involve releasing only the posterior capsule of the ankle and subtalar joints, along with lengthening the Achilles tendon.

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CONCLUSION

The future of IoT is virtually unlimited due to advances in technology and consumers' desire to integrate devices such as smart phones with household machines. Wi-Fi has made it possible to connect people and machines on land, in the air and at sea. It is critical that both companies and governments keep in ethics in mind as we approach the fourth Industrial Revolution (Pye, 2014). With so much data traveling from device to device, security in technology will be required to grow just as fast as connectivity in order to keep up with demands.Governments will undoubtable face tough decisions as to how far the private the sector is allowed to go in terms of robotics and information sharing. The possibilities are exciting, productivity will increase and amazing things will come by connecting the world.

With the exponential growth in internet usage, the next big thing in the queue of technological advancements is 'Internet of Things'. The entire world is migrating towards IOT which will have a huge impact on our lives in the coming five years. Leave about connecting computers, laptops and smartphones with the internet, now there will be a multitude of smart devices connected to the internet and each other. Starting from home appliances to big industrial machinery, everything will become smart. Some technology experts call it as the 'Next Digital Revolution' while others proclaim it as the 'Next Generation of Internet'.

IOT is believed to change the entire way people communicate, work and live. Now there will be connectivity for everyone, everything and everywhere. It is going to have an influential impact on how the businesses and government interact with the world.

According to NASSCOM, the global market size of IOT is expected to touch USD 3 trillion by 2020. In this landscape, startups are playing the biggest role in enabling IOT services in the consumer as well as the industrial segment. In India, there are more than 60 percent start-ups working on the lines of IOT with their highly technical and technological skills.

IOT proves to have a huge scope as it provides a unique opportunity for businesses to turn data into insights. There are a number of contributing factors as well that drive the adoption of IOT such as improved sensors, device connections, the evolution of lifestyle and mobility.

References:

- *Gibbons, PJ; Gray, K (September 2013). "Update on clubfoot". Journal of Paediatrics and Child Health. 49 (9): E434–7. doi:10.1111/jpc.12167. PMID 23586398.*
- ^ Jump up to:[a b c d e f g h i j k l m] *Dobbs, Matthew B.; Gurnett, Christina A. (18 February 2009). "Update on clubfoot: etiology and treatment". Clinical Orthopaedics and Related Research. 467(5): 1146–1153. doi:10.1007/s11999-009-0734-9. ISSN 1528-1132. PMC 2664438. PMID 19224303.*
- ^ *Moses, Scott. "Clubfoot". www.fpnotebook.com. Archived from the original on 15 October 2017. Retrieved 15 October 2017.*
- ^ Jump up to:[a b] *"Talipes equinovarus". Genetic and Rare Diseases Information Center (GARD). 2017. Archived from the original on 15 October 2017. Retrieved 15 October 2017.*
- ^ Jump up to:[a b] *Miedzybrodzka, Z (January 2003). "Congenital talipes equinovarus (clubfoot): a disorder of the foot but not the hand". Journal of Anatomy. 202 (1): 37–42. doi:10.1046/j.1469-7580.2003.00147.x. PMC 1571059. PMID 12587918.*
- ^ *Weymouth, KS; Blanton, SH; Bamshad, MJ; Beck, AE; Alvarez, C; Richards, S; Gurnett, CA; Dobbs, MB; Barnes, D; Mitchell, LE; Hecht, JT (September 2011). "Variants in genes that encode muscle contractile proteins influence risk for isolated clubfoot". American Journal of Medical Genetics Part A. 155A (9): 2170–9. doi:10.1002/ajmg.a.34167. PMC 3158831. PMID 21834041.*