NovaMed

Tech Solutions for Medical Industry

NovaMed is your one stop solution for all the tech needs in the medical industry. We connect with the best tech companies who aid in enhancing our processes with their solutions, namely:

3D Printing

Tele Medicine

Virtual Reality

Augmented Reality

Artificial Intelligence

3D PRINTING

3D printing is the action or process of making a physical object from a three-dimensional digital model, typically by laying down many thin layers of a material in succession.

The Global 3D Printing Medical Devices Market was valued at USD 0.68 billion in 2016 and is projected to reach USD 2.82 billion by 2025, growing at a CAGR of 17.13% from 2017 to 2025.

Source: https://www.marketwatch.com/press-release/3d-printing-medical-devices-market-size-growth-opportunity-and-forecast-to-2025-2019-11-19

Surgical Planning Models

3D models printed identical to the anatomic specifications of a patient helps doctors to plan a complicated surgery before hand. The use of accurate anatomic bio-models helps in figuring out more accurate diagnosis, cutting down the complexity & time of the surgery and improves post-operative outcomes. This in turn helps reduce hospital resources and the risk of complexities.

Medical Training

3D printed models foster rapid learning and improves performance of the trainees regardless of the area of expertise. 3D models help a lot during cadaver dissection, as the possibility to model different physiologic and pathologic anatomy from various images and data. It benefits many institutions that have fewer resources. The use of different densities and colours can bring out the accurate details of the human anatomy.

Patient education

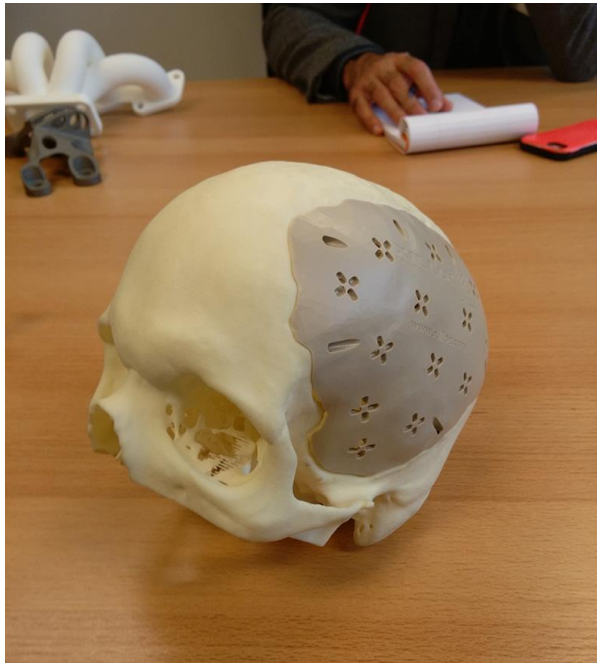
By far, 3D models have been the best and the most effective way to educate the patient regarding the complexity of the situation and the treatment process. The 2D imaging of his 3D anatomical structure through CTs and MRIs makes it difficult for the patient to understand and communicate. 3D printed models help improve the doctor-patient communication.

Patient-specific implant fabrication

Customized implants for patients helps improve the medical procedures aesthetically and also helps the patient to recover faster. 3D printing helps to produce patient-specific implants which are a perfect fit aesthetically and biologically for all body conditions by use of biocompatible composites for printing. Medical industry has seen its proven effects starting from the simplest of the dental implants such as accurate braces, dental restorations, castable crowns, etc to the more complex maxillofacial or craniofacial implants which help in facial reconstruction.

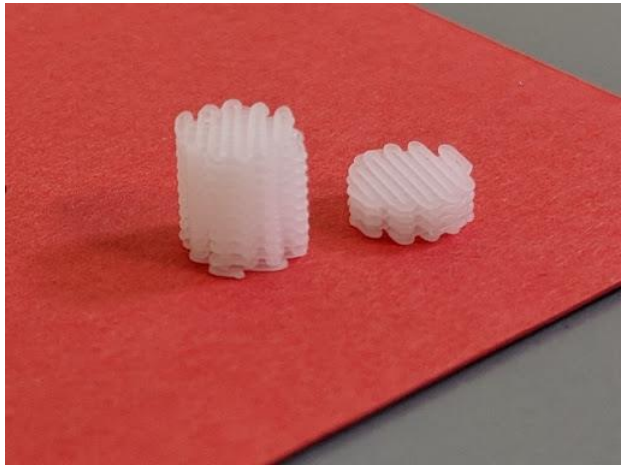
Today, the technology can be used to make a wide range of implants, including spinal, hip, knee and skull implants. By the end of 2019, it's estimated that over 600,000 implants will have been produced with 3D printing. By 2027, this number could increase to four million.

Source: https://amfg.ai/2019/08/30/3d-printing-in-healthcare-where-are-we-in-2019/



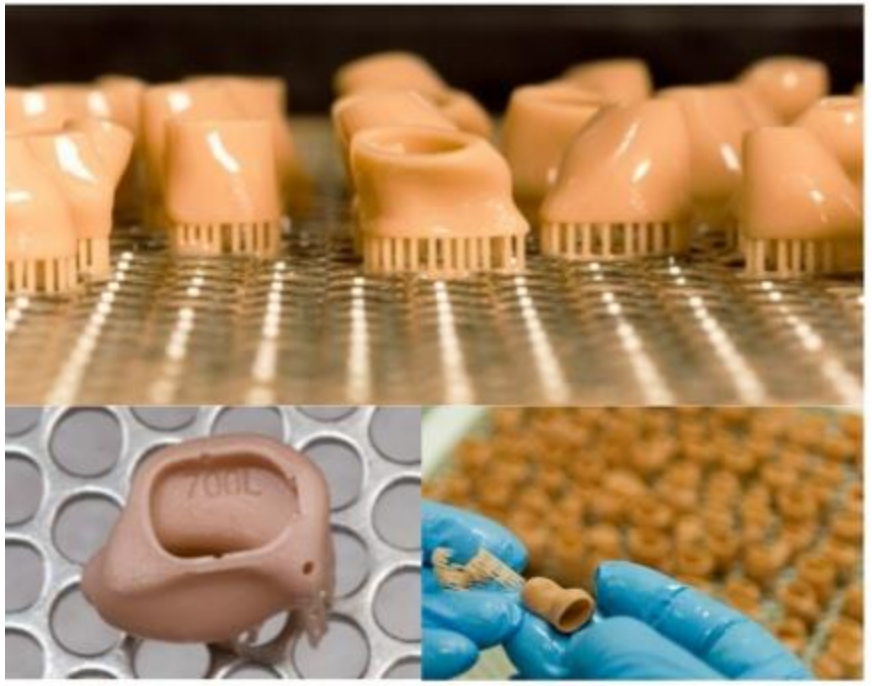
Tissue Regeneration using 3D scaffolds

Scaffolds are an essential part of bone tissue engineering due to its bio-compatible features such as mechanical support, cellular activity, protein production through biochemical and mechanical interactions. The 3D printed scaffolds acts as a template for cell attachment and stimulate bone tissue formation through the porous structure of the scaffolding.



3D hearing aids

3D hearing aids have been the entry point for 3D printing into medical field with the production of custom made hearing aids that suit every patient, It has developed in the last 10 years to a level where it has become more cost effective and a easier procedure for the doctors to provide the patients with a 3D printed hearing aid than the traditional ones.



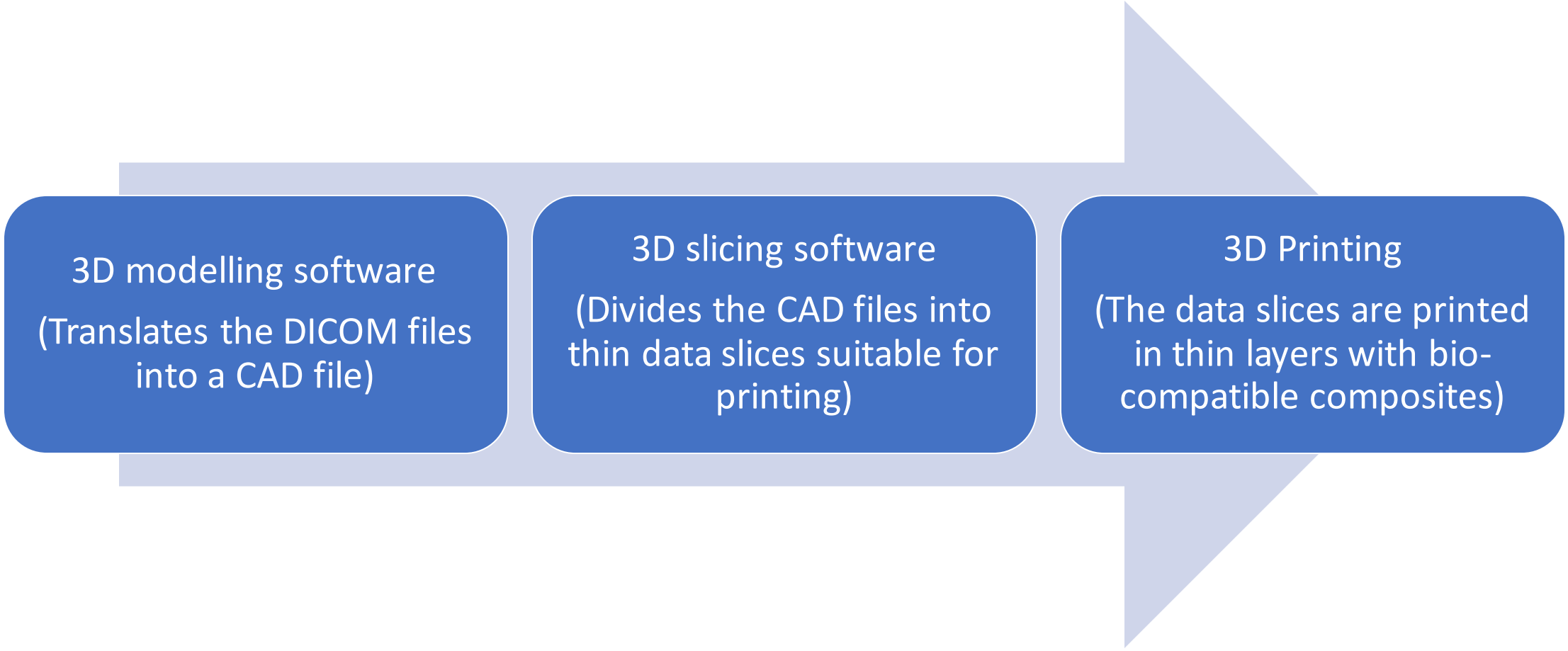
Prosthetics

The stories of triumph of 3D printed prosthetics in the field of medicine is endless with the creation of prosthetic hands and limbs especially for children who have lost their arms or legs in an accident. The 3D prosthetics gives a new life to the patients by making them experience the happiness of being back on their feet at a more affordable costs.

Organ Substitution

Researches are right now finding out the responsiveness of a live organ that has been 3D printed for the purpose of transplants. At an unfortunate scenario of non-availability of a donor, the 3D printed organs acts as a substitute for a real organ. This will aid in helping many more lives in the medical industry. Doctors will soon print 3D organs customised to the patient's bio-compatibility.

How 3D bio-models are created?



TELE-MEDICINE

Telemedicine is the exchange of medical information from one location to another using electronic communication. It can be through different services like,

E-mails,

Video conferencing,

Smart phones,

Mobile applications,

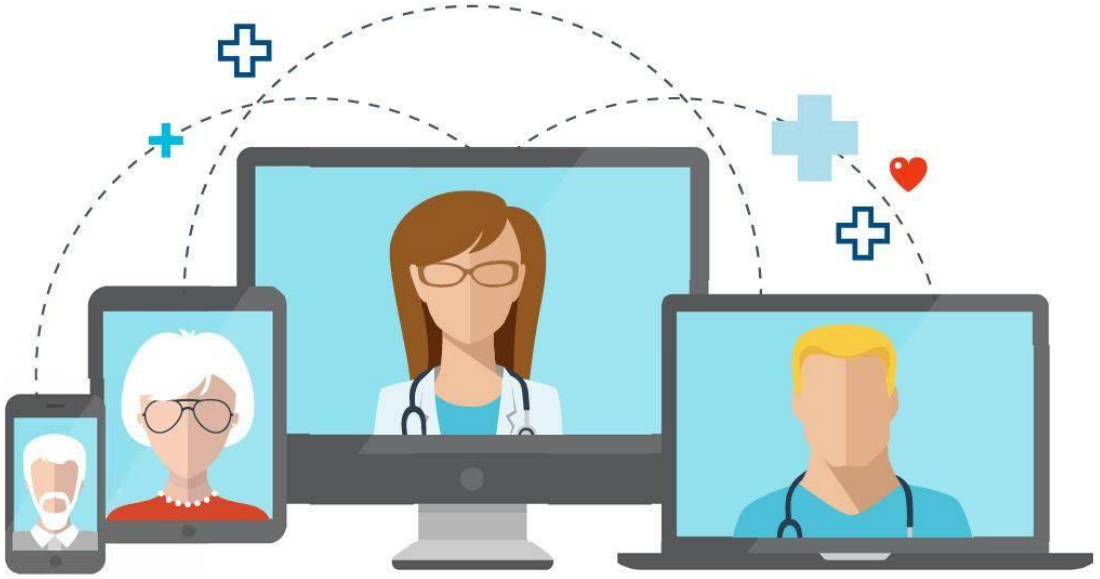
Websites and many more.

Difference between Tele-Medicine and Tele-Health

TELE-HEALTH	TELE-MEDICINE
Tele-health includes all heath services using tele-communication technologies.	Tele-medicine pertains specifically to clinical services.
Tele-health is more involved into public health, health education, delivery and support of healthcare.	Tele-medicine involves a doctor/clinician providing some kind of medical service from the other end.
Example: A public health app that alerts public of a disease outbreak	Example: A mobile app that lets physicians treat their patients remotely via video chats.

Connecting Doctors & Patients

Tele-Medicine connects doctors and patients from different parts of the world. At times of emergencies, patients get to interact, share reports with their doctors who are unreachable due to travel. Remote monitoring the major advantage of tele-medicine when it comes to doctor-patient communication.



Chronic Disease Management

Patients suffering heart disease, cancer and diabetes needs regular monitoring of their health. Tele-medicine helps in monitoring of such patients invariable of the physical presence of the doctor.

2nd Opinion

Tele-Conference has made the world a smaller place by bringing together doctors from around the world to give 2nd opinion of a specific case to patients else where in the world. This helps the patient to connect to experts and find feasible solutions for efficiently.

Tele-Mentoring & Knowledge sharing with students & trainees

Tele-conferencing has become the best way to share knowledge about unique cases from one part of the planet to students in medical universities. This helps the trainees to gain more knowledge and guidance from practitioners and subject matter experts around the globe.

Store & Share your medical history

Tele-medicine via websites lets the patients to store and share their medical records with doctors across the globe. This benefits in having a back-up of the medical records and also lets the doctors access the reports from anywhere by using mobile devices for a quick consultation or diagnosis at times of emergencies.

Tele-ICU

Tele-ICU is a method or gateway to reach out to doctors during the time of emergency and lack of doctor nearby at that moment. The Tele-ICU team will alert the doctor nearby and help the guide the attending nurse/caretaker to help reduce the criticality.

Ref video: https://youtu.be/aEHsDqyVaL4

"Every year, about 5.2 million people die due to human errors in India. Even in the US, the figure is not less than 44,000 to 98,000. It is not lack of medical skill or knowledge of doctors, but that of team coordination and communication during an emergency that lead to medical errors. Around 70% of deaths that occur due to medical negligence can be attributed to human errors," said Dr Rakshay Shetty pediatric intensivist at Rainbow Hospitals, Bengaluru.

Source:https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/Medical-negligence-70-of-deaths-are-a-result-of-miscommunication/articleshow/51235466.cms

Tele-Dentistry

Tele dentistry is the combination of technology and clinical information exchange for dentistry from remote places for consultation, treatment planning, education, dental care and public awareness.

Teleconsultation through tele-dentistry can take place in either of the following ways – “real-time consultation” or “store-and-forward or “remote monitoring” method.

Tele psychiatry

Tele-psychiatry is where the psychiatric assessment and care takes place through video conference. It involves evaluation, patient care, individual and group assessments, patient education and medication management.

Tele Ophthalmology

TeleOphthalmology is taking a higher shift in the medical field with not only consultation and care but also screening which is seeing the increase in demand. With smartphone apps that help the patient do their screening from wherever they are, initial diagnosis is done by self using tele ophthalmology apps. Defects like cataract, Retinal detachment, Glaucoma, Vitreoretinal diseases, etc can be identified.

Virtual Reality

Virtual reality is the technology of using computer generated images/environments that surround the person looking at them, making it seem almost real.

VR is medical industry is used majorly in 5 categories:

Medical Training

Patient Treatment

Medical Marketing

Disease Awareness

Pain Management/Relief

Medical Training

Virtual reality can be used to train the medical students on how to perform a particular procedure. Virtual patients are placed in a clinical environment from where the medical students can perform the procedure through a guided simulator.

VR for Physiotherapy

Virtual reality adds the excitement factor to the therapies that bore the patients who come for their physiotherapy sessions. With the help of sensors that are placed throughout the VR accessories and wearable sensors, tracking and mapping the patient's body becomes easy and also help is recording their performance digitally. It can be used for speed, response and monitoring the range of motion flexion and extension of joints. It can be used in motor rehabilitation of patients with stroke, movement disorders and Parkinson's disease.

According to the World Health Organization, 15 million people suffer stroke worldwide each year. Of these, 5 million die and another 5 million are permanently disabled.

Source: http://www.strokecenter.org/patients/about-stroke/stroke-statistics/

VR for PTSD

Post Traumatic Stress Disorder is one of the most disturbing mental health issues, that takes a longer time to recover from. Over 50 million people worldwide experience trauma through road traffic accidents (RTAs) yearly.

VR helps in exposing the patients to similar yet safer scenarios to revive them out of the fear caused due to the mishap which was the initial cause for PTSD.

Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5779792/

VR for phobia therapy/PTSD and Anxiety Disorder

VR acts as the perfect tool to aid exposure therapy which is a widely used technique for phobia treatments. Fully immersed environments created to specific phobia/anxiety disorder will help the doctor expose the patient to scenarios and make behavioural assessments before and after treatment. Below are few VR phobia experiences:

Fear for Heights, Flying, Animals, Blood, Public speaking, etc.

VR for Pain Management (VR Analgesia)

Relaxation techniques like guided meditation, immersing the patient in a peaceful environment will help manage acute and chronic pain.

“The most acceptable theory is the Gate theory of attention — it postulates that VR reduces the perception of pain by absorbing and diverting attention away from pain,” says Dr. Medhat Mikhael, a pain management specialist and medical director of the non-operative program at the Spine Health Center at MemorialCare Orange Coast Medical Center.

It can also be used to relieve patients undergoing phantom pain due to amputation.

VR acts as a non-pharmacological form of analgesia by exerting an array of emotional affective, emotion-based cognitive and attentional processes on the body’s intricate pain modulation system.

VR for pain management of burn care
VR for dental pain procedures
VR for pediatric IV procedure

VR for Memory Loss treatment

VR has been proved to help patients fight memory loss / dementia. The doctor not only treats the patient but will also be able to assess them and have a progress track of the patient with the help of data derived from their VR experience. Neuroscientists have been working with this immersive technology in the last few years in helping the patients fight memory loss by letting them visit their childhood locations in VR.

Source: https://www.beingpatient.com/virtual-reality-therapy-alzheimers-dementia/

Worldwide, around 50 million people have dementia, with nearly 60% living in low- and middle-income countries. Every year, there are nearly 10 million new cases.

Source: https://www.who.int/news-room/fact-sheets/detail/dementia

VR for autism

VR for social interactions

VR for public speaking and eye-contact

(Source: Study by Yale University)

VR cognitive therapy for phobias like balloons, public transport, animals, etc

How do we do?

(Analyse the autistic patient's with the help of therapists and creating gamified modules to expose the patient stage by stage and assess how he reacts / interacts with the virtual objects over the period of time.)

The Center for Brain Health and The Child Study Center at Yale University's School of Medicine collaborated to help young adults with ASD achieve economic and social independence with the help of VR. Carly McCullar, who has ASD, went through the Center's social cognition training during her senior year

It is estimated that worldwide one in 160 children has an ASD.

Evidence-based psychosocial interventions, however, such as behavioural treatment and skills training programmes for parents and other caregivers, can reduce difficulties in communication and social behaviour, with a positive impact on the person's well-being and quality of life.

Source: https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders

VR for lazy-eye and cross eye treatment

Worldwide there are 12 million children with visual impairment due to uncorrected refractive errors that can affect their learning development. Evidence has shown that visual deficits can be identified through visual acuity testing and that affordable treatments to correct vision can improve the quality of life of the population.

Visual training Video games has been one of the effective approaches to treat eye problems like lazy eye and cross eye. Researches have been trying to use similar approach with VR where the viewer's eye can be tracked and see how to cure lazy eye and cross eye through continued sessions for correcting their defect.

Source: https://www.who.int/bulletin/volumes/94/9/15-163634/en/

Augmented Reality

AR is a technology that superimposes a computer-generated image on a user's view of the real world through camera devises like smart phones and HMDs. The use of AR in medical field are,

AR for drug information

AR for medical education

AR for minimal invasive surgery

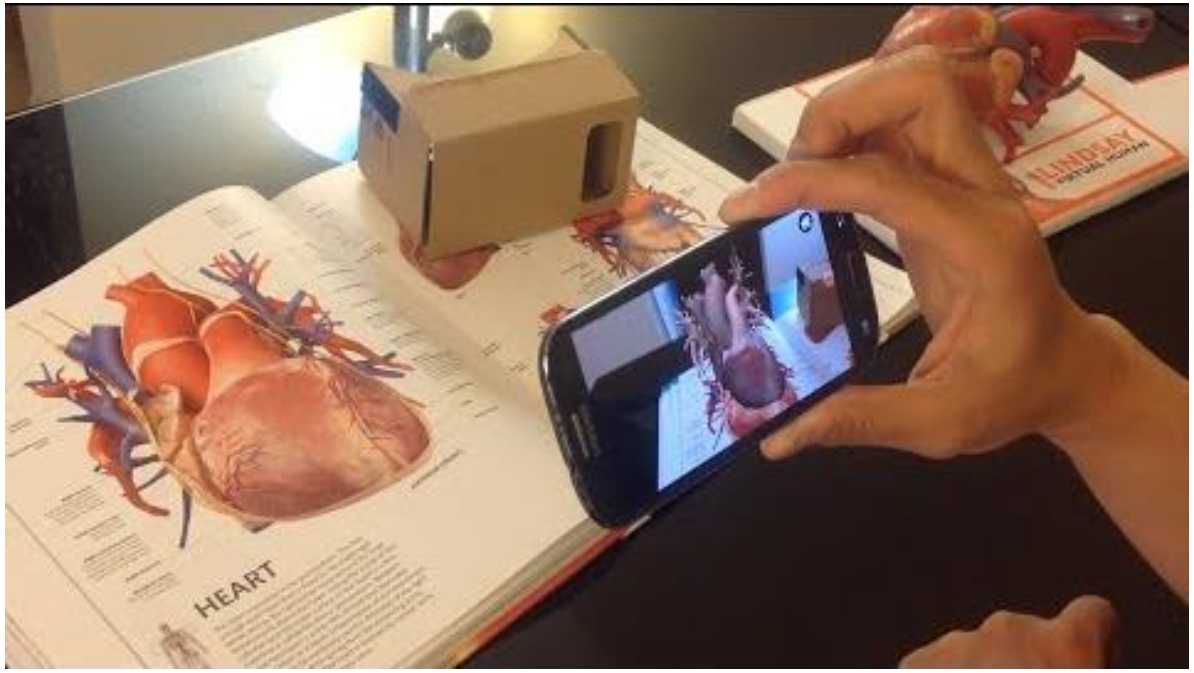
AR for IV

AR for drug information

Pharma companies can help educate the customers about the drug using AR. Pop-up videos/information on the scan of a tablet through an AR application from your smartphone will help educate the patients about the drug.

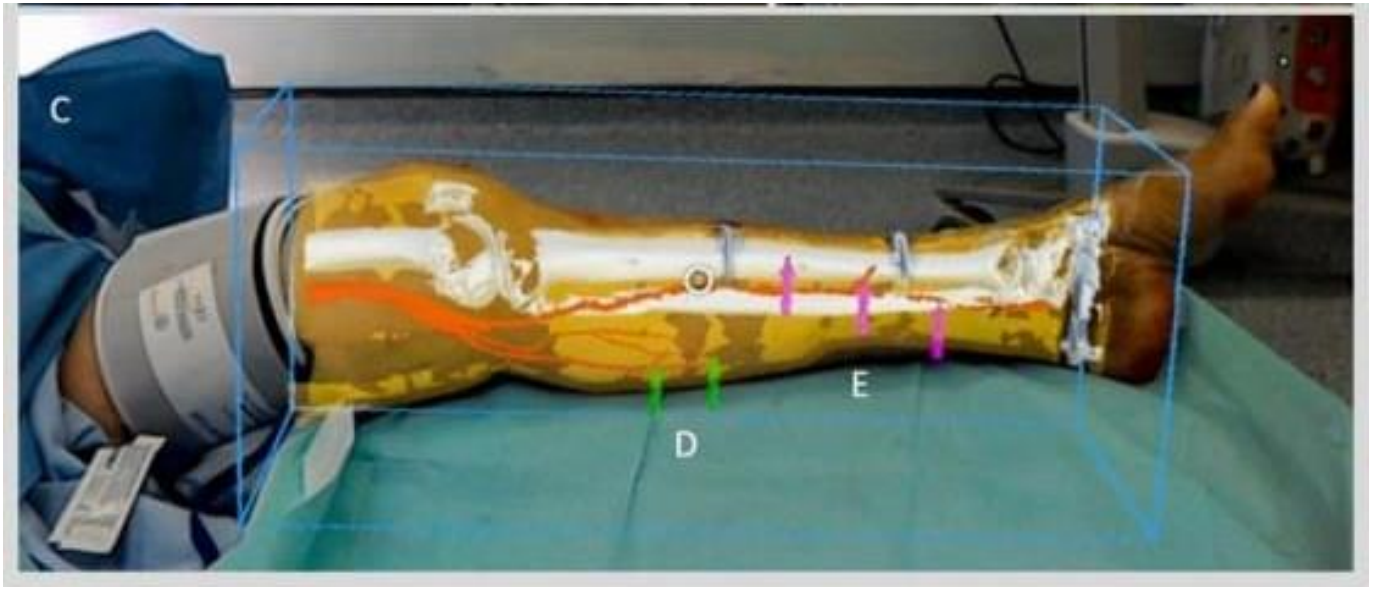
AR for medical education

AR in medical education can happen over many forms like text books, 3D models etc. A 3D view of a drawing from the textbooks can help the students in better visualization. AR also lets medical students to perform a procedure in AR over a 3D anatomical model of any organ.



AR for safer surgery

Augmented Reality aids doctors during surgery by projecting 3D scan images of the patients on the patients body letting them identify major vessels, nerves , etc. This gives the surgeon an X-ray vision and helps save time in difficult and long surgeries.



AR for IV

Finding the veins becomes difficult with children and elderly people. AR scanners helps first timers to find the veins easily for IV injections. The hand held scanners projects the identified veins on to the patient’s skin and makes it easier to inject.

AI and Wearables

Wearable have been capturing the hearts of the public in the last 5 years with the increase in fitness bands and smart watches that keeps a track on the user's health. Further to bands and watches , the healthcare industry is coming up with wearable ECG, BP monitors, biosensors that capture movement, heart rate, respiration rate, etc.

AI refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. AI in healthcare will enter every department accessing the patient details and managing and monitoring them from far away through mediums like smartphones, etc. AI powered radiology machines to find the problems during the scan itself and suggesting the next measure without need for human interference. Similarly, AI powered robots performing operations is on to look forward to.