SUMMARY OF WHAT WILL BE COVERVED IN SPEECH..

INTRODUCTION OF **PROSTHESIS**

* Introduction
  + Prosthesis, well it’s a Greek term, meaning, addition. Addition of some artificial device that replaces a missing body part.
* Traumatic, congenital..
  + Now this missing part can be due to two reasons. It may be either missing right from birth, which we call congenital, or it may be lost due to accident or injury, traumatic. Whatever may be the reason the replacement of missing body part by artificial one is what we call as prosthesis.
* **Types** – these types includes how to achieve the prosthesis and what are different techniques of prosthesis. (functions that the artificial part can give you). The types of prosthesis also give us an idea of how this field progressed over the period of time.
  + **Cosmetic prosthetics**
    - One of the earliest attempt in this area
    - To disguise injuries and disfigurements.
    - These parts are made up of PVC and silicon.
    - Examples
      * Pirates of cerribian - Like pirates use eye stones in place of eye ball.
      * Artificial non-functional limbs.
  + **Mechanical prosthetics**
    - Mechanical prosthesis can be understood and distinguished from robotics prosthesis which we will be discussing further. Typically here there are some switches which will control the movement of the limb. These switches can be employed on feet or some other working part of the body.
  + **Robotics prosthetics**
    - This I would say is the general term or the much broader term under which all the modern day prosthesis can be categorised. As the term implies it fuses robotics with medical science and the applications that follow has really amused mankind. This topic, robotics prosthesis is a very hot topic of research now-a-days and is widely researched upon across the globe in several top-notch universities. Huge budgets are allocated for its research by defence agencies even since its application in defence is known.
    - Mechatronics
      * In general the science or the basic idea behind prosthesis is biomechatronics. The term can be split into two parts ie bio and mechatronics. Bio is something that relates to biology while mechatronics is fusion of mechanical and electronics. Eg- washing machine, robotics. So in essence what do want to do is that we make use of algorithms inside electronics to make mechanical parts intelligent. So mechanical parts move according to some decision that may be taken in real time.
    - Biomechatronics
      * Now in biomechtronics what we do is that, we take a signal from our nerves in real time and feed these signals to electronics that take appropriate decision according to the intelligent algorithms and control systems that move mechanical parts. Hence acting like the original biological part. Now this biomechatronics, involving the biology, mechanical and electronics, is a very ambitious multidicipilinary project and requires innovation and research.
    - **Biosensors** take signals from muscular or nervous system(or in simpler terms it senses our decision or will) and feeds to the controller (a controller is an electronic part that decides according to binary logic, more generally we call such a controller as a MCU), and the **controller** controls the mechanical parts(arm etc) in a closed loop feedback control mechanism. Further, artificial sensors say thermistors, etc measure temperature at the mechanical part and communicates the information to the controller which in turn lets body sense and conveys it to the brain.. Now depending on how do we take signal from brain we have roughly
      * Myoelectric prosthesis
      * Neuroprosthesis (cognitive prosthesis)
    - We will discuss these myoelectric and neuroprosthesis later in detail, before that lets have a **basic idea of how prosthesis work**..

So this was the overview of the prosthetics and a basic idea of how it works. Takes signal from the body (which flows down from the brain through neurons) in some form and processes the signal extract relevant information in the form of desire of doing something say, unfolding the arm, and send more powerful signals to mechanical parts for the desired action to take place. So this is the very basic idea of how prosthetics works…

HOW IT OPERATES..

* Bioelectricity
  + **Bioelectromagnetism** (sometimes equated with **bioelectricity**) refers to the electrical, magnetic or [electromagnetic fields](http://en.wikipedia.org/wiki/Electromagnetic_field) produced by living [cells](http://en.wikipedia.org/wiki/Cell_(biology)), [tissues](http://en.wikipedia.org/wiki/Biological_tissue) or [organisms](http://en.wikipedia.org/wiki/Organism). Examples include the cell [membrane potential](http://en.wikipedia.org/wiki/Membrane_potential) and the [electric currents](http://en.wikipedia.org/wiki/Electric_current) that flow in [nerves](http://en.wikipedia.org/wiki/Nerve) and [muscles](http://en.wikipedia.org/wiki/Muscle), as a result of [action potentials](http://en.wikipedia.org/wiki/Action_potential).
    - Example is **ECG** in which we record the electrical activity of the heart
* BIOSENSORS
  + That detects this bioelectricity.
  + Myoelectrical – non invasive recording of the muscle activity.
    - **Targeted REINNERVATION**
  + **Brain controlled interfaces**
    - **Neuroprosthesis**
      * very ambitious thing.. applications will totally change the way we communicate, interact, look and perform tasks. We can even increase or add to our organs.
        + **Cortical plasticity**

Which says brain is plastic or malleable

* + - * EEG (Electro enchaphograph) and fMRI
        + obtain **motor commands** noninvasively
      * chronic brain implants
        + record this electrical activity right from inside the **motor cortex**.

HOW FAR HAS THE TECHNOLOGY DEVELOPED and what is possible future improvements..

* Monkey experiment
* Human robotics
* Use in warfare..

Demerits

* Oscar Pistorius
  + Blade runner
  + Fastest man on no legs
  + Is the record holder in 100,200 and 400m runs with the aid of carbon fiber flex foot

**Electrophysiology**

Man controls prosthetic hand with mind - <http://www.youtube.com/watch?v=ppILwXwsMng&feature=related>

Monkey controls robotic arm with brain computer interface - <http://www.youtube.com/watch?v=gnWSah4RD2E>