rajeea news

Department of Mechanical Engineering

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ROLE OF MECHANICAL ENGINEERING

Mechanical engineering is a diverse subject that derives its breadth from the need to design and manufacture everything from small individual parts and devices (e.g., microscale sensors and inkjet printer nozzles) to large systems (e.g., spacecraft and machine tools). The role of a mechanical engineer is to take a product from an idea to the marketplace. In order to accomplish this, a broad range of skills are needed.

The mechanical engineer needs to acquire particular skills and knowledge. He/she needs to understand the forces and the thermal environment that a product, its parts, or its subsystems will encounter; to design them for functionality, aesthetics, and the ability to withstand the forces and the thermal environment they will be subjected to; and to determine the best way to manufacture them and ensure they will operate without failure. Perhaps the one skill that is the mechanical engineer's exclusive domain is the ability to analyze and design objects and systems with motion. Since these skills are required for virtually everything that is made, mechanical engineering is perhaps the broadest and most diverse of engineering disciplines.

Mechanical engineers play a central role in such industries as

- **automotive** (from the car chassis to its every subsystem—engine, transmission, sensors)
- **aerospace biotechnology** (implants, prosthetic devices, fluidic systems for pharmaceutical industries);
- **computers and electronics** (disk drives, printers, cooling systems, semiconductor tools);
- **micro electromechanical systems, or MEMS** (sensors, actuators, micropower generation);
- **energy conversion** (gas turbines, wind turbines, solar energy, fuel cells);
- **environmental control** (HVAC, air-conditioning, refrigeration, compressors);
- **automation** (robots, data and image acquisition, recognition, control); manufacturing (machining, machine tools, prototyping, microfabrication).

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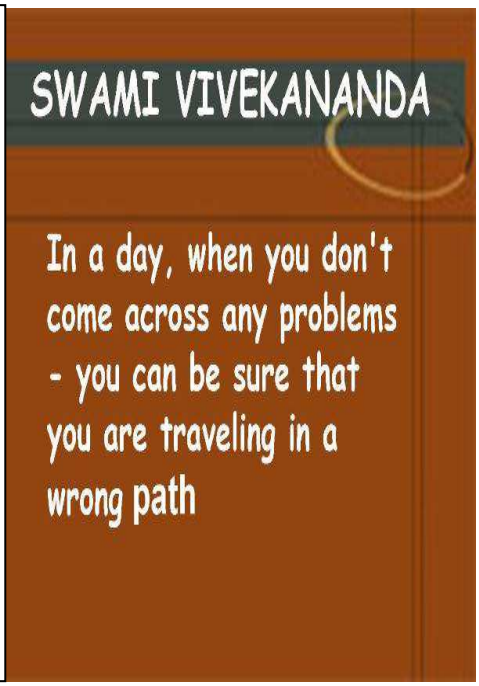
To put it simply, mechanical engineering deals with anything that moves, including the human body, a very complex machine. Mechanical engineers learn about materials, solid and fluid mechanics, thermodynamics, heat transfer, control, instrumentation, design, and manufacturing to understand mechanical systems. Specialized mechanical engineering subjects include biomechanics, cartilage-tissue engineering, energy conversion, laser-assisted materials processing, combustion, MEMS, microfluidic devices, fracture mechanics, nanomechanics, mechanisms, micropower generation, tribology (friction and wear), and vibrations.

The breadth of the mechanical engineering discipline allows students a variety of career options beyond some of the industries listed above. Regardless of the particular path they envision for themselves after they graduate, their education will have provided them with the creative thinking that allows them to design an exciting product or system, the analytical tools to achieve their design goals, the ability to overcome all constraints, and the teamwork needed to design, market, and produce a system.



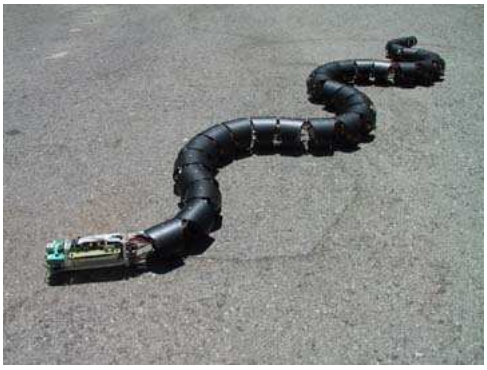
SNAKE ROBOT

A snakebot is a biomorphic hyper-redundant robot that resembles a snake.

Snake robots come in all shapes and sizes, from the three meters long, fire fighting snakebot developed by SINTEF, to a medical snakebot developed at Carnegie Mellon University that is thin enough to maneuver around organs inside a human chest cavity. Though snakebots can vary greatly in size and design, there are two qualities that all snakebots share. First, their small cross section to length ratio allows them to move into, and maneuver through, tight spaces. Second, their ability to change the shape of their body allows them to perform a wide range of behaviours, such as climbing stairs or tree trunks.Additionally, many snake robots are constructed by chaining together a number of independent links. This redundancy makes them resistant to failure, because they can continue to operate even if parts of their body are destroyed.

Applications

Snakebots are most useful in situations where their unique characteristics give them an advantage over their environment. These environments tend to be long and thin like pipes or highly cluttered like rubble. Thus snakebots are currently being developed to assist search and rescue teams.



Furthermore, when a task requires a number of different obstacles to be overcome, the locomotive flexibility of snakebots makes them good candidates. For example, if you need a robot to carry a camera to the top of a tree that is growing in water you have to do three things: move over

ground to the water's edge, swim to the tree, and then climb the tree. You could make a robot that does any one of those three very well, but being able to do all three, and many other difficult combinations, is what makes snake robots exceptional.

Also, snakebots can be used by animal control officers to subdue rabid or invasive creatures. Raccoons, barn cats, and large rodents typically respond to the snakebot's presence with attacks upon which the snakebot will emit an electrical shock and paralyze the aggressor.

Locomotion

Traditional snakebots locomote purely by changing the shape of their body, just like snakes. Many variants have been created which use wheels or treads for locomotion. As of yet, no snakebots have been developed that can completely mimic the locomotion of real snakes, but researchers have been able to produce ways of moving that do not occur in nature.

When researchers refer to how a snakebot moves they often refer to a specific gait, where a gait is just a periodic mode of locomotion. For example, sidewinding and lateral undulation are both gaits. Snakebot gaits are often designed by investigating period changes to the shape of the robot. You can think of a caterpillar moving by changing the shape of its body to match a sinusoidal wave. Similarly, snakebots can move by adapting their shape to different periodic functions.

Howie Choset, a rambunctious roboticist who has been working on snake-like robots for decades at Carnegie Mellon University, has developed a new, ultra-slim snakebot that can crawl inside a small incision and perform surgery on your heart or excise prostate tumors. It has been successfully tested on pigs, and will now be used in human trials.

With Choset's snakebot, the surgeon makes a keyhole incision, and then feeds the snake into it. The surgeon uses a remote control to guide the snake to the damaged/diseased organ (no doubt causing skin undulations a la *Alien*), where it then extends its miniature tools and gets to work.

While exact specs are hard to come by, Choset says the diameter of the robot's head is less than that of a US dime (18mm). The robot has 102 joints, a camera in the head, and can slither around your organs with amazing precision. If you've ever seen a large snake slither around its human handler, it's a lot like that — only on a much smaller scale. For some (fairly graphic) photos of what the snakebot looks like in action, hit up Choset's BioRobotics website. Embedded at the end of the story is a video of an older snakebot working its way into a pig.

While we've spent a lot of time writing about humanoid robots, doggy packmule robots, autonomous quadcopter robots, and even the science of falling in love with robots, *medical* robots are possibly the most important sphere of robotics. For over a decade now, surgeons have been using robotic hands, arms, and snakes to visit places that

their hands simply can't reach without making a huge incision. With robotic surgery, incisions are smaller, operations are shorter (and thus cheaper), and patients recover faster. Robotic hands, which the surgeon simply grips in his own hands to remove hand shakes and increase flexibility, are very commonly used.

Moving forward, it's important to note that this snakebot is tethered — it uses an external power source and its movements are entirely controlled by the surgeon — but we're now only a few years away from untethered bots that crawl freely around your anatomy. First these will undoubtedly be wirelessly controlled by the surgeon, but it's only a matter of time until they become autonomous, small enough to wiggle around your vasculature, and eventually garner the prestigious title of "nanobots."

Staff Corner

Seminars/Workshops/Conferences attended by the Faculty:

Dr.V.Chittaranjan Das , Professor , attended Faculty Development program on " Advanced Numerical and Statistical Techniques for Engineers(ANSTE)" organized by NIT Calicut during May 30th - June 03rd ,2011.

Research Papers Published in Journals :

- **N.V.V.S. Sudheer**, KVJ Rao and B.Srinivasa Rao, "*Investigation on Influence of Refrigerated Air in Turning of Aluminium Metal Matrix Composite*", Published in International journal of Applied Research, ISSN 0973-4562 Volume 6, Number 5 (2011) pp. 931-938.
- **C.Srinivas ,** B.Satyanarayana, K.Ramji and Naveen Ravela "*Modeling and Simulation of row based Flexible Manufacturing Systems"* International Journal Of Applied Engineering Research **(** IJAER),Vol6,No 8(2011), pp1483-1491.
- **C.Srinivas ,** B.Satyanarayana, K.Ramji and Naveen Ravela , *"A Determination of Buffer size in single and multi row Flexible Manufacturing Systems through simulation"* International Journal of Engineering Science And Technology (IJEST) Vol. 3 No. 5 May 2011 pp 3889-3899

Additions to the Faculty

S.No	Name	Designation	Date of Joining
1	V.Tarachand	Lecturer	20-06-2011

Faculty Relieved From Services

S.I	Name	Designation	Date of Relieving
1	M.Siva Nayak	Lecturer	04-06-2011
2	S.Vijay Kumar	Lecturer	04-06-2011

Department Activities

Guest Lectures:

Sri. K.Raghava , Flying Officer, Indian Air Force, delivered a Guest Lecture on " **Prospects in Indian Air Force**" on 29th June 2011 to Final Year Students.

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