EXCITING AND DYNAMIC OPPORTUNITIES

Mechatronic engineering is a combination of precision mechanical engineering, electronics and computer systems. A typical mechatronic system is characterised by close integration of the mechanical components (e.g. mechanism links, gears, etc.), electronic sensors (e.g. sensors for position, speed, light and temperature measurement), mechanical and electrical actuators (e.g. linear and rotating electrical motors, hydraulic cylinders and flow control valves) and computer controllers (e.g. custom-built controllers, personal computers and industrial computers).

In order to combine all these elements in an optimal way (cost-effective, flexible, and with the highest performance), mechatronic engineers must have insight into each of these disciplines. Some mechatronic engineers specialise in consumer products like DVD players and washing machines, while others specialise in the application of robots and robot groups. At Stellenbosch University the programme focuses mainly on the development of automated systems for industry. This includes robots and automated assembly lines, as well as a wide range of systems where accurate control plays a key role.

The most important difference between mechanical and mechatronic engineers who are educated at the Department of Mechanical and Mechatronic Engineering, is that mechanical engineers are equipped to develop mechatronic systems using existing controllers (computers, PLC's, etc.), while mechatronic engineers are also equipped to develop the electronic controllers (e.g. for built-in controllers) and the relevant electronics themselves. For the BEng (Mechatronic) programme at Stellenbosch University, some of the more specialised elements of the BEng (Mechanical) programme are replaced with electronics and computer engineering modules from the BEng (Electrical and Electronic) programme.

CAREER OPPORTUNITIES

Mechatronic engineers (men and women) may be employed in enterprises of any size, both in South Africa and internationally. There are numerous small and medium-sized enterprises that develop and use mechatronic systems where mechatronic engineers are needed.

RESEARCH AREAS

Biomechatronics – the application of mechatronics to healthcare, with the ultimate aim of improving healthcare delivery by developing appropriate technologies, especially for those who have limited access to modern healthcare, e.g. biological signal processing, non-invasive physiological monitoring, biomechanics, telemedicine and robotics in medicine; development of novel medical equipment and software that can assist a medical practitioner with diagnostics, or to monitor or examine a patient remotely; researching fundamental problems in orthopaedic biomechanics, sports science and physiotherapy to improve treatment, performance and rehabilitation.

Automation and machine vision – development of automated systems for manufacturing, such as assembly lines, focused on South African circumstances; the application of multiple cameras, smart cameras and own customised software for fast 3D measurement, e.g. for surgical targeting, dimensional metrology, factory automation and vehicle guidance.

Micrometrology – measurement techniques to nanometre accuracy for manufacturing microcomponents (sizes from micrometres to millimetres) for application in medical devices, vehicles, defence systems, etc.; measurement of challenging features, such as deep holes in fuel injection nozzles, and development of methods to obtain full 3D geometrical information.

Robotics and control – the development of control systems for robots and automated systems such as unmanned aircraft; controlling networks of small robots that outperform a few complex robots, using robot soccer as development platform.

ENQUIRIES

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FAKULTEIT INGENIEURSWESE

MEGATRONIESE INGENIEURSWESE

BEHEER JOU TOEKOMS

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

OPWINDENDE EN DINAMIESE GELEENTHEDE

Megatroniese ingenieurswese is 'n kombinasie van presisie meganiese ingenieurswese, elektronika en rekenaarstelsels. 'n Tipiese megatroniese stelsel word gekenmerk deur 'n noue integrasie van die meganiese onderdele (bv. meganisme-skakels, ratte, ens.), elektroniese sensore (bv. sensore vir posisie, snelheid, lig en temperatuur), meganiese en elektriese aktueerders (bv. lineêre en roterende elektriese motors, hidrouliese-silinders en vloeibeheerkleppe) en rekenaar-beheerders (bv. doelgeboude beheerders, persoonlike rekenaars en industriële rekenaars).

Om al hierdie elemente op die beste wyse (goedkoopste, plooibaarste, en met die hoogste werkverrigting) te kan kombineer, moet megatroniese ingenieurs goeie insig in elkeen van hierdie gebiede hê. Sommige megatroniese ingenieurs spesialiseer in verbruikersprodukte soos DVD-spelers en wasmasjiene. Ander megatroniese ingenieurs spesialiseer in toepassing van robotte en groepe van robotte. Die program by Universiteit Stellenbosch is egter in die algemeen gefokus op die ontwikkeling van outomatiese stelsels vir die nywerheid. Dit sluit robotte en geoutomatiseerde monteerlyne in, maar ook 'n wye reeks stelsels waar akkurate beheer 'n sleutelrol speel.

Die belangrikste onderskeid tussen meganiese en megatroniese ingenieurs wat by die Departement Meganiese en Megatroniese Ingenieurswese opgelei word, is dat meganiese ingenieurs toegerus word om megatroniese stelsels te ontwikkel wat bestaande beheerders gebruik (rekenaars, PLC's, ens.), terwyl megatroniese ingenieurs ook toegerus word om self die doelgeboude rekenaars (bv. vir ingeboude beheerders) en die verwante elektronika te ontwikkel. By Universiteit Stellenbosch word daarom sekere meer gespesialiseerde elemente van die BIng (Meganies)-program met elektronika en rekenaar-ingenieurswese uit die BIng (Elektries en Elektronies)-program vervang in die BIng (Megatronies)-program.

BEROEPSMOONTLIKHEDE

Megatroniese ingenieurs (mans en vroue) kan in van die grootste tot die kleinste ondernemings in Suid-Afrika en internasionaal werk. Daar is talle klein tot mediumgrootte ondernemings wat megatroniese stelsels ontwikkel en bedryf waar megatroniese ingenieurs in aanvraag is.

NAVORSINGSVELDE

Biomegatronika – die toepassing van megatronika in gesondheidsorg, met die uiteindelike doel om die beskikbaarheid van moderne gesondheidsorg te verbeter deur toepaslike tegnologie te ontwikkel, veral vir diegene wat nie redelike toegang tot gesondheidsorg het nie, bv. biologiese seinverwerking, fisiologiese monitering, biomeganika, telemedisyne en mediese robotte; ontwikkeling van oorspronklike mediese toerusting en programmatuur wat 'n mediese praktisyn help om diagnoses te doen, of om 'n pasiënt oor 'n afstand te monitor via telemedisyne; ondersoek fundamentele probleme in ortopediese biomeganika, sportwetenskap en fisioterapie om behandeling, prestasie en rehabilitasie te verbeter.

Outomatisasie en masjienvisie – ontwikkeling van outomatiese stelsels vir vervaardiging, soos monteringslyne, toegespits op Suid-Afrikaanse omstandighede; die toepassing van veelvuldige kameras, slim kameras en eie doelgemaakte programmatuur om 3D-metings vinnig te doen, bv. vir belyning van chirurgiese instrumente, dimensionele metrologie, fabrieksoutomatisasie en voertuig begeleiding.

Mikrometrologie – meettegnieke tot nanometer akkuraatheid vir die vervaardiging van mikrokomponente (groottes van mikrometers tot enkele millimeters) vir toepassings in mediese toestelle, motorvoertuie, verdedigingstelsels, ens.; die meting van moeilike aspekte, soos diep gate in brandstof inspuiters, en ontwikkeling van metodes om volledige 3D-geometriese inligting te bepaal.

Robotika en beheer – die ontwikkeling van beheerstelsels vir robotte en outomatiese stelsels soos onbemande vliegtuie; die beheer van netwerke van klein robotte wat beter kan presteer as enkele komplekse robotte, met robotsokker as ontwikkelingsplatform.

NAVRAE

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