

October 09, 2019

## Press Release

### **maxon Group Australia develops haptic feedback system.**

**Produced entirely in-house, maxon Group Australia designed and delivered a complete solution on a system that sensed, and measured, the subjective perception of pressure.**

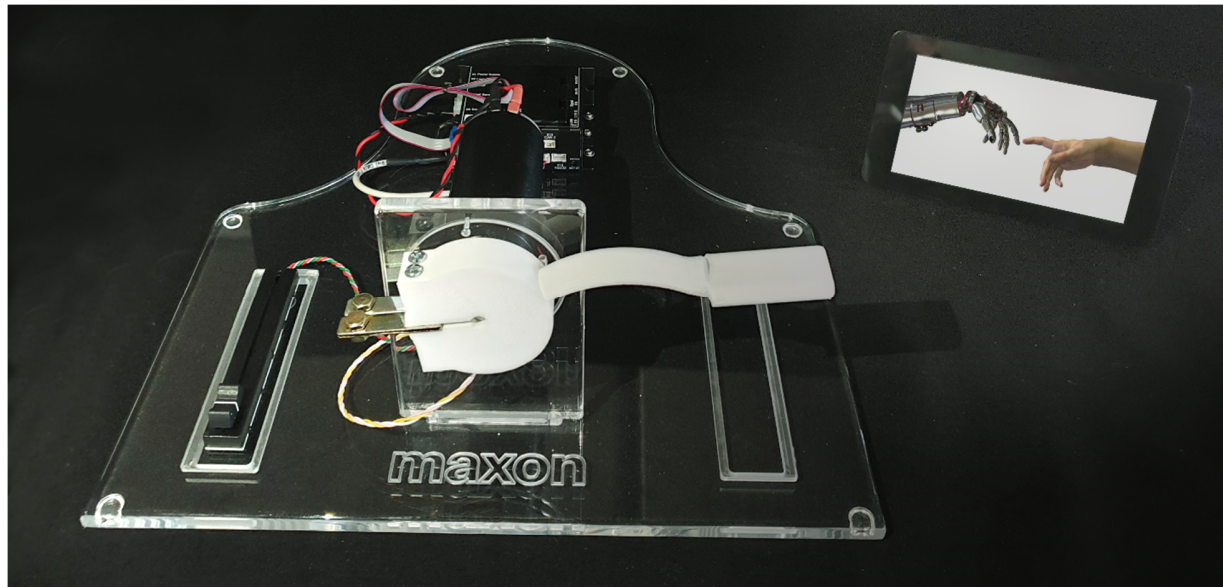
maxon have long been involved in assisting customers with the selection of their DC motors and drive systems within haptic applications. The obvious involvement of maxon is support in selecting the appropriate DC motor and controller. It is perhaps not a traditional connection that maxon be involved in the development of a device from concept stage through to the creation of the algorithms to gather data and provide valid haptic feedback. maxon Australia R&D team led by Dr Carlos Bacigalupo created such a device in-house and all in one mechanism.

Macquarie University Australia PhD candidate David McNaughton initially contacted maxon in July 2018 for assistance with DC motor selection. David needed to build a sensitive test instrument as part of his PhD thesis. After many communications with maxon application engineers, David realised there was no better candidate to build complex motorised instrumentation than the motor manufacturers themselves.

David said "It became quickly apparent in the discussions with maxon that the skills and knowledge to build such a device required a high level of specialisation. After meeting with the application engineers, I was confident they could deliver this bespoke device in a timely manner. maxon were professional and detail orientated throughout the developmental stages of the device, which led to the device meeting brief specifications. The goal of this research is to understand important perceptual and sensory processes involved in the human body. maxon's insights to improve the device compared to previous models has been crucial in making this possible".

#### **Complex force control**

The aim of the instrument was to produce adjustable levels of force to the finger of a test subject. The forces needed to be generated in three specific methods. Each of these methods requires a specific behaviour from the motor controller. Either by being idle, directly targeted or manually controlled by a slider, the instrument had to comply with well defined experimental protocols.



*The Haptic Feedback System developed by maxon Australia and Macquarie University Australia PhD candidate David McNaughton © maxon Group*

Four different target forces were required for David's tests. 1N, 1.5N, 2N and 2.5N and the forces needed to be randomly selectable and quickly applied by the operator. All test data needed to be recorded for later analysis.

There were three main considerations to the application:

1. the DC motor and controller to switch between manual or automatic operation;
2. the need to produce adjustable levels of force;
3. real time recording and translation of data into meaningful language for analysis.

Of the many motors considered for the force application the maxon Rare Earth 50mm, 200W was selected because of its linear characteristics, detent free, coreless rhombic winding design, proportionally low mass inertia and a high torque constant of 242mNm/A allowing for extremely fine control over the applied pressure.

Coupled with the motor was an optical encoder with 20,000 quad count resolution for feedback to the maxon EPOS 4 motion controller. Dr Carlos Bacigalupo said "Carefully selected gain adjustments and a well-tuned PID feedback loop are required for this type of sensitivity. The configuration and testing cycle is greatly accelerated by the powerful tuning wizards in the EPOS Studio, but it is also vital to have the ability to individually manage all necessary parameters within the controller's object dictionary". maxon provided a colour touch screen for operator interface, with custom quick set controls and overriding fine adjustment facilities. The test data is recorded to a USB stick.

#### **maxon: expertise is beyond motors**

maxon have supplied many motors to customers who develop their own systems. Being involved from the concept to the finalised product was an exciting step. "maxon Australia quickly became interested in the project and showed no hesitation in an ability to deliver" said David. "Their

professionalism, in depth knowledge and enthusiasm to build the device were significant factors toward awarding the contract to Maxon. The design, construction and programming of this bespoke device would not be possible without the knowledge and expertise of maxon application engineers.”

maxon are excited to bring ideas to fruition and turn concepts into reality. This is a unique project that will have far reaching gains beyond helping David to achieve results for his PhD.

For application requirements involving system design, engineering, integration and complete drive systems please contact maxon Group Australia tel. +61 2 9457 7477.

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The press release is available on the internet at: [www.maxongroup.net.au](http://www.maxongroup.net.au)



*maxon DC motor RE50 © maxon group*

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**The Swiss specialist for quality drives**

maxon is a developer and manufacturer of brushed and brushless DC motors. as well as gearheads, encoders, controllers, and entire mechatronic systems. maxon drives are used wherever the requirements are particularly high: in NASA's Mars rovers, in surgical power tools, in humanoid robots and in precision industrial applications, for example. To maintain its leadership in this demanding market, the company invests a considerable share of its annual revenue in research and development. Worldwide, maxon has more than 3000 employees at nine production sites and is represented by sales companies in more than 30 countries.