

# Business News Letter

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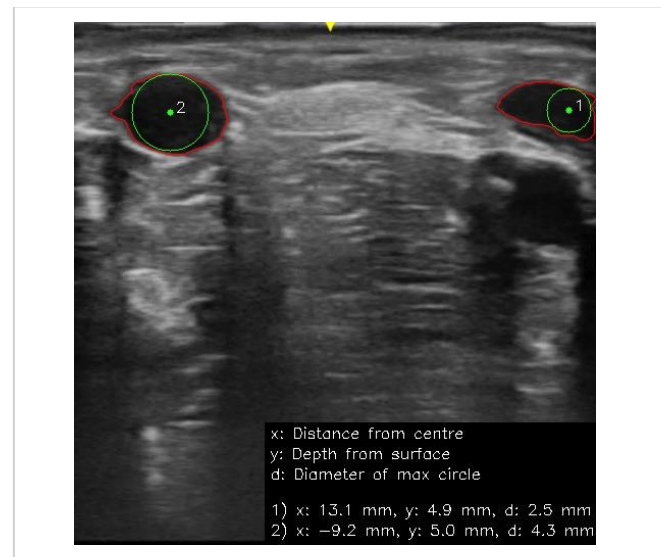
## 4 Identification of blood vessels on ultrasound images using deep learning

An essential step on the way to an automated venipuncture device is to find suitable blood vessels in the patient's arm for puncture. With the help of an ultrasound probe, these blood vessels can be made visible. To enable automated puncture, a computer must be able to identify the blood vessels on the images taken by the ultrasound probe. This skill must be taught to the computer in a process called machine learning. The prerequisite for this is a suitable data set. In the run-up to the master's thesis, a data set was built up by taking ultrasound images of volunteers. Subsequently, with the help of a radiologist, the blood vessels on these images were marked.

As part of the master's thesis, this data set will be used to develop a machine learning model that is able to detect superficial blood vessels on ultrasound images. The position, size and shape of the vessels are evaluated to determine which vessel is best suited for puncture.

At this point, the development of a first working version of the machine learning model has been completed. In a next step, a scientific literature search will be carried out to identify state-of-the-art machine learning techniques and thus optimize model performance.

The results are displayed in a user interface, as shown in the following figure.



**Ultrasound image with two identified blood vessels**

The user of the puncture is able to select one of the vessels for puncture. Once the choice has been made, the user can start the automated puncture. For this purpose, the information about the selected blood vessel is sent to a microcontroller, which controls the puncture process by means of motors.