

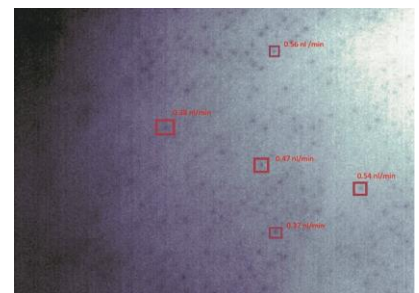
## Investigating Sweat Glands Activity with Thermal Imaging

To observe the behaviour of sweat glands, a new non invasive technique was developed, using thermal imaging. The behaviour can be characterized by the sweat rate, meaning the outflow rate of sweat of out the sweat gland. The sweat forms a droplet on the skinsurface, which then evaporates into the air, causing a local decline in temperature on the skin surface. A finite element model was developed, which simulated this process. The results of this simulation were used to numerically fit a function which predicted the local temperature caused by the evaporation of a sweat droplet on the skin surface. This function depends on the measured temperature of the skin, which is not affected by the evaporation, the ambient temperature, the relative humidity of the air and the radius of the sweat droplet. Since the droplet temperature can be measured on the skin, this function can be solved to obtain the droplet radius, which cannot be measured. Over the droplet radius, the droplet temperature, the ambient parameters and the materials parameters of water diffusivity and density, the sweat rate can then be calculated. The measured sweat rates were typically between 0.3 and 0.6nl/min. Which is slightly below literature values of 5 to 10nl/min. To make this technique applicable, a setup was developed consisting of a graphical user interface (GUI) and a fixation for the body part, where the sweat glands are investigated. With this GUI thermal images can be taken and the activity of sweat glands can be observed and quantified.

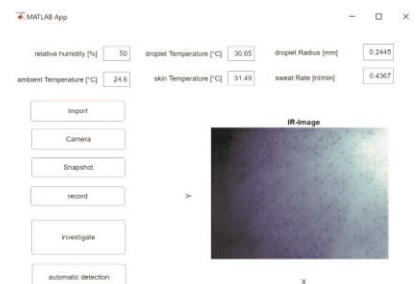


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Some sweat rate of sweat glands on the finger. Many other active sweat glands visible.



Graphical User Interface (GUI)