1. Introduction
Human skin has various pathologies in the form of acute and chronic diseases. Some are only cosmetic diseases which are not harmful for life but they can affect mental health and disrupt daily activities. Hyperhidrosis is one of these cosmetic diseases which may be caused by diabetes, infections, or thyroid hyperactivity, or can be inherited [1]. There are some examinations for testing hyperhidrosis, e.g. gravimetric and minor starch-iodine test. There are some devices that can measure sweat but are not specifically used or even intended for hyperhidrosis due to geometrical limitations. We present a device called electronic sudometer, specially designed to assess condition of hyperhidrosis patients.

2. Method
A non invasive prototype instrument called electronic sudometer using the principle of electrical impedance measurement has been developed. The philosophy behind this prototype is to make an instrument which can detect hyperhidrosis during homeostasis as well as in pathological condition. The device injects a sinusoid electric current and detects the ensuing voltage, which is proportional to the impedance of skin during hyperhidrosis. For this prototype, the electrode system is made of brass rings mounted on a handle. The signal is then processed in electronic assembly. Processed output is transferred to a Laptop with specially made connecting wire. Computer having MatLab plots the signal and shows voltage level corresponding to sudor level. The signal output can also be displayed on a Smartphone, requiring another specially made interface. The signal flow is depicted in Figure 1.

3. Results
Laboratory test results in the form of a plot of output voltage versus impedance shows accuracy of the device. The impedance results can be translated to sweat level because impedance decreases with increasing sweat during hyperhidrosis. We also calibrated the sudometer using fixed precision resistors over its working range. Clinical tests are planned but have not yet been performed when this abstract is written. So far, tests are carried out using an artificial skin at various sweat levels and to a yeast tissue model. Hydration of the artificial skin was quantified weighing precision cut samples on a laboratory balance.

4. Discussion
Any clinical device must be validated for accuracy and evaluated for safety before applying it on patients. The device output seems to be well correlated to sweat level. Being a palmar hyperhidrosis patient himself, first author applied the electronic sudometer to his palms and the results look quite promising. At different environmental temperatures, the author checked elicited sweat responses. Patient safety is always a concern for clinicians regarding new devices. For this reason, we have made the device battery operated, and a new version will be entirely powered from a Smartphone.

Reference

Figure 1: Electronic Sudometer flow diagram