1. Discuss the classes of wearable sensors presented in the paper. What are the basic body-to-signal transduction methods for each?

Wearable sensors have recently seen a large increase in both research and use. There are several wearable sensors that exist and each of them have a specific function to help them carry out some task. There are separate groups for each wearable sensor and each has its own body-to-signal transduction method. For example, there are four kinds of mechanical sensors: piezoresistive, capacitive, iontronic, and piezoelectric. The first one is the piezoresistive sensor. When conductive materials are subjected to mechanical deforma- tion, their electrical properties change. This electromechanical response is known as the piezoresistive effect. The second mechanical sensor is the capacitive sensor. Capacitive sensors are highly attractive sensing mechanisms for mechanical stimuli, as they have gained popularity in consumer electronic touch screens with good device sensitivity, low power consumption, and adaptive sensing. The third kind of mechanical sensor is the iontronic sensor. The iontronic sensor uses electrical double-layer (EDL) based supercapacitors which enables a high surface area and an electrical capacitance that is at least 1000 times higher than that of similarly sized traditional parallel plate capacitive sensors. This sensing mechanism enables greater immunity to environmental or body capacitive noises, which is of importance for wearable applications. The last mechanical sensor is the piezoelectric sensor which is based on piezo arterial pulses pressure waveform, detecting body movements, and biomechanics characterization as far as the sensing mechanism. cal setting, this piezoelectric device has been configured into a biomechanics characterization tool to detect soft tissue viscoelasticity. The device has been brought into contact with textured skin and organ surfaces to conduct the measurement under quasi-static and dynamic conditions. Also, there are electrical sensors which have to do with measuring a change in electrical resistance of the skin or measure changes in capacitive or conductively coupled charge at the skin surface. In most cases, high-input- impedance electronics are used to detect these very small changes in charge. There are two types of electrical contacts, wet electrodes and dry electrodes. Wet electrodes combine a solid conductive pad interfaced to the skin via an electrolyte gel that mini- mizes the impedance of skin by: hydrating it; forming a conformal electrical contact with its textured surface. Dry electrodes eliminate the electrolyte materials en- tirely, and rely instead on direct contact with the skin. Another example of wearable sensors is the optical sensor. Optical measurement systems designed for capturing such information vary widely, from highly accurate, large-scale setups designed for use in clinical or laboratory settings, to primitive but functional platforms that integrate with consumer electronic goods such as wrist-mounted wearables, to newly emerging skin-like devices that combine the most attractive features of the other two options. In each case, light sources introduce light into the body through the skin, and by changes in light scattering and light absorption the body reveals information through the light that is back-reflected to an optical detector. The wavelength of these sources can range from UV into the deep infrared, depending on the needed penetration depth and significant absorption peak for the relevant sensing application. Inte- grated optics, diffraction gratings, narrowband optical filters and bulk lenses represent some examples of affiliated passive devices for light capture, wavelength selection and light guidance. Last but not least, there are chemical sensors. These sensors can be used for continuous real-time monitor- ing of chemical markers is desired for obtaining comprehensive information about the wearer's health, perfor- mance or stress at the molecular level. The epidermis as an information barrier, the skin, oral mucosa in the mouth, the cornea of the eye, and all other ex- ternally facing tissue surfaces, are, by design, nearly perfect barriers to most chemicals. These fluids present further challenges, in that most large analytes are diluted, many analytes are not detected at blood levels and only represent local physiology, and fluids such as sweat and tears are secreted in miniscule volumes. As a result, there are several sensors with specific purposes and unique body-to-signal transductions.