ELEC-E8712 Design for Reliability (5 cr)

1st midterm exam 5.10.2021

Figure below shows an example from "smart shoe", which contains pressure sensors attached to a flexible/stretchable substrate and a rigid printed circuit board containing a battery, other electronic components and a microchip that connects with your phone via Bluetooth. The sensors measure the pressure your foot exerts with each footfall and the data on impact force and location, contact time, and cadence are collected for analysis purposes.

a) Discuss on the reliability requirements of the "smart" system on the basis of "stress vs strength" approach and "bathtub" curve. (**7p**)

b) By using the components/materials from "smart shoe" as examples, please explain the difference between threshold stress failure, cumulative stress failure and combined threshold- cumulative stress failure. (**3p**)

c) Explain briefly how you would estimate the failure rate λ(=1/MTTF) of the "smart shoe" by using MIL-HDBK-217Parts Count Method. (**2p**)

d) Please elaborate on the stresses (and their effects on the reliability) imposed to the sensor during the entire life cycle. (**2p**)

NB. Essay type answers are NOT required!