

COMPUTER SCIENCE TRIPOS Part II – 2020 – Paper 8

11 Mobile and Sensor Systems (cm542)

HearMe Ltd. has put a new wearable for the ear (earable) on the market that, in addition to other sensors, has an accelerometer. The company is hoping to use the accelerometer to analyze human activity recognition (HAR) of the users.

(a) What are the challenges the company will face in collecting the accelerometer data for human activity recognition (on their servers)? [5 marks]

(b) What are the steps of the HAR pipeline (you should also discuss person dependent/independent aspects)? Please use examples only related to accelerometer sensing.

[5 marks]

(c) What are the limitations of applying Deep Learning to HAR data for analysis and how can they be obviated?

[5 marks]

(d) The company would like to be able to perform HAR on-device on the earable. However, the current model running on the servers does not fit in its processor. What techniques can be applied to the model to make it run on the device efficiently and indicate in which way each helps? [5 marks]