COMPUTER SCIENCE TRIPOS Part II – 2017 – Paper 8

13 Topical Issues (RKH)

A key challenge for autonomous vehicles is the classification of nearby objects, particularly in urban environments. For example, understanding whether an object is a static litter bin or a child about to cross the road should alter a vehicle's behaviour.

(*a*) As a first step many autonomous vehicles form a point cloud representing their local environment. Explain how this is done using lidar sensors. Your explanation should cover the pulsed and continuous-wave variants and the resolution of range ambiguities.   [6 marks]

(*b*) One approach to classifying objects is for the vehicle to match against a detailed world model containing the positions of all street furniture. Discuss the advantages and disadvantages of this approach and describe how such a large model could be built.   [8 marks]

(*c*) An alternative IoT-based approach has all street furniture tagged using Bluetooth Low Energy beacons. Suggest how a vehicle could reliably associate beacon broadcasts with point-cloud objects. How could your solution be improved if a cluster of nearby vehicles were able to communicate?   [6 marks]