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SCUOLA DI INGEGNERIA INDUSTRIALE
E DELL'INFORMAZIONE

IoT Challenge #1, Exercise sink placement

Internet of Things

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COORDINATES 6.87168 7.65929 8.15501

1.1. Data

- 10 sensors
- $T_{transmission} = 10$ minutes
- $b = 2000$ bit
- $E_b = 5$ mJ
- $E_c = 50$ nJ/bit
- $E_{tx} = k \cdot d^2$ nJ/bit
- $k = 1$ nJ/bit/m^2

Sensor	Position
1	(1, 2)
2	(10, 3)
3	(4, 8)
4	(15, 7)
5	(6, 1)
6	(9, 12)
7	(14, 4)
8	(3, 10)
9	(7, 7)
10	(12, 14)

Table 1.1: Sensor position table

1.2. Point A

Sink position = $(x_s, y_s) = (20, 20)$

We calculated the distance of the farer sensor (sensor 1) from the sink using the cartesian distance:

$$distance_1 = d\{(1,2),(20,20)\} = \sqrt{(20-1)^2 + (20-2)^2} = \sqrt{685}m$$

$$E_{cycle,1} = E_c \cdot b + E_{tx(1)} = 50nJ/bit \cdot 2000 \text{ bit} + 1nJ/bit/m^2 \cdot 685m^2 \cdot 2000 \text{ bit} = 1.47 \cdot 10^{-3}J$$

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1.1 Sensor position table 1