

Final Exam

Long Answer Questions:

- 1. What has been the impact of ubiquitous computing on HCI research focused on the home?**

Ubiquitous computing has influenced home-based HCI research by integrating interaction mechanisms which adapt to a variety of user needs and environmental contexts. Advancements in sensing technologies enable devices to understand and predict user behaviors towards more intuitive user-friendly interactions. Also, research in HCI has been used to understand individuals' behaviors, beliefs, and values in relation to the use of sensors used to monitor different things about themselves and others. One interesting study on ICT technologies in Africa, M-Kulinda, demonstrated how different cultures in east and southern Africa integrated sensor technologies in their home finding that it entrenched patriarchal beliefs and practices along the axes of gender and class.

- 2. Discuss one example of how machine learning could be used in the development of a gadget used in the home.**

Combining AI and sensor technology allows for real-time data-driven decisions, to make systems more responsive to users. For example, a gadget could use a light sensor and a temperature sensor connected to an Arduino to collect ambient conditions. This data can then be used to train a machine learning model to predict lighting needs based on time of day and occupancy.

- 3. Which sensor would be best for detecting a bright light?**

- A) Thermistor
- B) Photodiode
- C) Capacitive touch sensor
- D) Bulk-hetero junction semi-conductor

Answer: B Photodiode

Photo diodes are the only option on this list which can both sensitively detect and efficiently convert photons into electrical current.

4. What is the correct order of steps in a (proper) development cycle of a machine learning model?

- A) Evaluate, Train, Collect, Preprocess, Deploy
- B) Preprocess, Train, Evaluate, Collect, Deploy
- C) Deploy, Collect, Evaluate, Train, Preprocess
- D) Collect, Preprocess, Train, Deploy, Evaluate

Answer: D Collect, Preprocess, Train, Deploy, Evaluate

Explanation: The correct sequence for developing a machine learning model starts with (C) collecting data, followed by (D) preprocessing the data to prepare it for analysis. Next, (B) training the model with the prepared data. Once trained, (A) we evaluate the model's performance to ensure it meets the desired criteria. Finally, (E) it is deployed for use in real-world applications or more testing.

5. What is the purpose of a pull-up resistor in a digital logic circuit?

- A) To ensure the line goes to a high state when not being actively driven to low
- B) To increase the current flow through the circuit
- C) To filter noise from the power supply
- D) To decrease the voltage to a safe level

Correct Answer: A To ensure the line goes to a high state when not being actively driven to low.

Explanation: A pull-up resistor is used to ensure that a wire is pulled to a high state by default in the absence of an overriding signal.

6. Which parameter describes the rate at which work is done in an electrical circuit?

- A) Resistance
- B) Current
- C) Power
- D) Charge

Correct Answer: C Power

Explanation: Power describes the rate of energy transfer or the rate at which work is done in an electrical circuit.

7. Which scenario is most likely to cause a short circuit in an electronic device?

- A) Connecting a resistor with too high of a resistance value in parallel
- B) Using an underrated capacitor in terms of voltage
- C) Exposing electrical connections to a conductive liquid
- D) Using both 3v and 5v VCCs in the same circuit

Correct Answer: C exposing electrical connections to a conductive liquid.

Explanation: Exposing a connection to conductive liquid could cause components to connect which otherwise should not.