Bonus Task (Extra 10%)

- **Quantum Computing Simulation**: Use IBM Quantum Experience to code a simple quantum circuit. Explain how it could optimize an AI task (e.g., faster drug discovery).

Title: *Quantum Simulation for Precision Agriculture in Food-Insecure Regions*

Problem It Solves: Traditional AI struggles with simulating complex agricultural ecosystems — soil chemistry, weather patterns, crop genetics — especially when variables interact in nonlinear ways. Quantum computing can simulate these systems more accurately and faster.

Quantum Advantage:

- **Simulation:** Quantum algorithms model soil-nutrient interactions and crop growth under varying climate conditions
- **Optimization:** Quantum annealing finds the best crop rotation and irrigation schedules across thousands of variables
- **Data Processing:** Quantum machine learning accelerates pattern recognition in satellite and sensor data

Impact by 2030:

- Boosts yield predictions in unpredictable climates
- Tailors farming strategies to micro-regions
- Reduces input waste (water, fertilizer) and improves sustainability

Risks & Mitigation:

- **Risk:** Quantum tech may be inaccessible to low-income regions **Mitigation:** Use cloud-based quantum services with mobile interfaces
- **Risk:** Ethical concerns around algorithmic control of farming decisions **Mitigation:** Keep farmers in the loop with explainable AI outputs