**Tahoe Quantum: Quantum Computing for Wildfire Prevention**

Wildfires are a growing global concern, increasingly fueled by climate change and urban expansion. Managing such disasters requires the rapid and efficient allocation of limited resources—firefighters, equipment, water supplies, and more—to ensure the best possible response. Moreover, monitoring wildfire situations is challenging due to their unpredictable and rapid spread. In this challenge, we aim to address some of the critical problems faced by firefighters using quantum computing.

We formulate challenges about resource allocation and monitoring as Quadratic Unconstrained Binary Optimization (QUBO) problems. We guide teams in learning about Quantum Annealing and the Quantum Approximate Optimization Algorithm (QAOA) the challenges in the QUBO framework. Quantum computers are particularly suited for solving quantum annealing and QAOA problems where exploring complex, high-dimensional solution spaces is necessary.

Teams are responsible for:

* Clearly defining a specific resource allocation or monitoring problem related to wildfire prevention.
* Formulating the problem within the QUBO framework.
* Solving the problem using either Quantum Annealing or QAOA.
* Optionally extending their solutions to additional challenges or running them on actual quantum computing hardware.

**Deliverables:**

* A presentation summarizing their approach and results.
* A brief technical writeup explaining the solution methodology.
* Annotated iPython notebooks showcasing simulation results and code.

**Judging Criteria:**

* **Technical Implementation and Use of Quantum Tools:** 30%
* **Correctness & Practicality:** 30%
* **Creativity:** 20%
* **Presentation:** 10%
* **Writeup and Notebook:** 10%

**Starter Resources:**

* <https://arxiv.org/pdf/1811.11538>
* <https://arxiv.org/abs/1006.1696>
* <https://arxiv.org/abs/1602.07674>
* <https://ieeexplore.ieee.org/document/8477865>