CLAIMS:

1. A hybrid quantum/classical computer implemented method useful in tracking one or more targets in a field of view comprising:

(a) receiving positioning data from a sensing system scanning a field of view containing one or more targets over successive sensing times (t_0, …t_k) thereby collecting over time a batch (B_k) of scans (S_1,…,S_k) of sensed plots;

(b) for a current batch (B_k) of scans (S_1,…,S_k) of sensed plots:

i) processing a graph (G) containing said sensed plots as N vertices (V) and possible connections between pairs of plots associated with consecutive scans as edges (E);

ii) defining a cost function of the edges so as to favor geometrically relevant edge patterns for the targets being tracked;

iii) associating in said cost function each edge with a quantum state encoded by $\log_2 N$ binary variables;

iv) optimizing said cost function using a quantum processing system by determining the ground state of a Hamiltonian encoding the cost function using the Variational Quantum Eigensolver algorithm by converting said Hamiltonian to Pauli strings and measuring expectation values of said Pauli strings;

v) processing one or more tracks based on a histogram built on statistics provided by the measured expectation value of said Pauli strings.

2. The method according to claim 1, further comprising a merger procedure between the current batch B_k and another batch of sensed plots B_p, said merging procedure using the Variational Quantum Eigensolver algorithm in order to connect tracks of B_k to tracks of B_p.

3. The method according to claim 2, wherein processing of the graph in the merging procedure further comprises defining for each track end in a current batch a edge head and for each track start in the other batch a edge tail.

4. The method according to claim 1, wherein measuring the expectation values of said Pauli strings comprises, measuring each qubit in the axis provided by the Pauli string.

5. The method according to claim 2, wherein measurement is only possible in the Z axis and Clifford gates are used to transform between axes.

6. The method according to any one of the preceding claims, wherein when two of said Pauli strings commute, they are both measured simultaneously using a same Ansatz.

7. The method according to any one of the preceding claims, wherein the positioning data comprises ranging data derived from a sensing system such as a radar, a lidar, a sonar, a camera, or other sensors.

8. The method according to any one of the preceding claims, wherein processing of the graph further comprises defining for each edge a tail vertex belonging to a given scan and a head vertex belonging to a subsequent scan and wherein the cost function includes:

- coefficient variables of terms associated with binary variables of first and second edges such that the head vertex of the first edge coincides with the tail vertex of the second edge are a predetermined decreasing function of an angle formed between said first and second edges;
- coefficient variables of terms associated with binary variables of first and second edges sharing a common tail vertex or a common head vertex are set as penalties.

9. The method according to claim 8 wherein said predetermined decreasing function F of the angle formed between said first and second edges is defined as a cosinus function $\mathrm{F}(\theta) = -\cos(\theta)$.

10. The method according to claim 8, wherein said predetermined decreasing function F of the angle formed between said first and second edges is defined as a Heaviside step function $\mathrm{F}(\theta) = 1, \theta < 90°$ and $-1, \theta \geq 90°$.

11. The method according to claim 8, wherein said predetermined decreasing function F of the angle formed between said first and second edges is defined as a rectangular function, a sign function or a trigonometric function.

12. A system useful for tracking one or more targets in a field of view comprising a classical computing system coupled to a quantum computing system, wherein

(a) the classical processing system is configured for:

i) receiving positioning data from a sensing system scanning a field of view containing one or more targets over successive sensing times (t_0, …t_k) thereby collecting over time a batch (B_k) of scans (S_1,…,S_k) of sensed plots;

ii) for a current batch (B_k) of scans (S_1,…,S_k) of sensed plots:

- processing a graph (G) containing said sensed plots as N vertices (V) and possible connections between pairs of plots associated with consecutive scans as edges (E);
- defining a cost function of the edges so as to favor geometrically relevant edge patterns for the targets being tracked;
- associating in said cost function each edge with a quantum state encoded by $\log_2 N$ binary variables;
- optimizing said cost function using a quantum processing system by determining the ground state of a Hamiltonian encoding the cost function using the Variational Quantum Eigensolver algorithm by converting said Hamiltonian to Pauli strings and measuring expectation values of said Pauli strings;
- processing one or more tracks based on a histogram built on statistics provided by the measured expectation value of said Pauli strings.

13. The system according to claim 12, further configured for processing a merger procedure between the current batch B_k and another batch of sensed plots B_p, said merging procedure using the Variational Quantum Eigensolver algorithm in order to connect tracks of B_k to tracks of B_p.

14. The system according to any one of claims 12 to 13, further comprising the sensing system.

15. A computer program product facilitating tracking of one or more targets in a field of view of a sensing system comprising computer readable storage medium having program instructions embodied therewith, the program instructions executable by a classical processing system and a quantum processing system coupled therewith to:

(a) receive, using the classical computing system, positioning data and/or doppler data from a sensing system scanning a field of view containing one or more targets over successive sensing times (t_0, …t_k) thereby collecting over time a batch (B_k) of scans (S_1,…,S_k) of sensed plots;

(b) using the classical computing system, for a current batch (B_k) of scans (S_1,…,S_k) of sensed plots:

i) processing a graph (G) containing said sensed plots as N vertices (V) and possible connections between pairs of plots associated with consecutive scans as edges (E);

ii) defining a cost function of the edges so as to favor geometrically relevant edge patterns for the targets being tracked;

iii) associating in said cost function each edge with a quantum state encoded by $\log_2 N$ binary variables;

(c) using the quantum computing system, implementing a variational quantum circuit for optimizing said cost function using a quantum processing system by determining the ground state of a Hamiltonian encoding the cost function using the Variational Quantum Eigensolver algorithm by converting said Hamiltonian to Pauli strings and measuring expectation values of said Pauli strings;

(d) using the classical processing system, processing one or more tracks based on a histogram built on statistics provided by the measured expectation value of said Pauli strings.