$$SpaceClassification : y \in Space \mapsto s \in \{Free, Restricted, Occupied, Uncertain\} \tag{4.10}$$

$$DataFusion : \begin{bmatrix} InformationSource_1 \times \\ InformationSource_2 \times \\ \times \cdots \times \\ InformationSource_l \times \\ SensorFusion(\dots) \times \\ Weather(\dots) \\ position \times \\ fixed\ time\ t_{fix} \times \\ dataFusionParameters \end{bmatrix} \rightarrow \begin{cases} Free(t_{fix}) \\ Occupied(t_{fix}) \\ Restricted(t_{fix}) \\ Uncertain(t_{fix}) \end{cases} \tag{4.19}$$

$$Mission = \left\{ \begin{matrix} waypoint_1, waypoint_2, \dots, waypoint_m : \\ \forall_{i=1\dots m} waypoint_i \in Space \end{matrix} \right\}, \quad m \in \mathbb{N}^+, m \geq 2 \tag{4.6}$$

$$\forall t \in [missionStart, missionEnd] :$$
$$distance(x(t), Occupied(t), t) \geq safetyMargin \tag{4.21}$$

$$state = [x, y, z, roll, pitch, yaw]^T \tag{6.1}$$

$$input = [v, \omega_{roll}, \omega_{pitch}, \omega_{yaw}]^T \tag{6.2}$$

$$\begin{aligned} \frac{\mathrm{d}x}{\mathrm{d}time} &= v\cos(pitch)\cos(yaw); & \frac{\mathrm{d}roll}{\mathrm{d}time} &= \omega_{roll}; \\ \frac{\mathrm{d}y}{\mathrm{d}time} &= v\cos(pitch)\sin(yaw); & \frac{\mathrm{d}pitch}{\mathrm{d}time} &= \omega_{pitch}; \\ \frac{\mathrm{d}z}{\mathrm{d}time} &= -v\sin(pitch); & \frac{\mathrm{d}yaw}{\mathrm{d}time} &= \omega_{yaw}; \end{aligned} \tag{6.4}$$

$$MovementSet = \left\{ \begin{matrix} Straight, Left, Right, Up, Down, \\ DownLeft, DownRight, UpLeft, UpRight \end{matrix} \right\} \tag{6.11}$$

$$Buffer = \left\{ movement(j) : \begin{matrix} movement(j) \in MovementSet(eq.11), \\ j \in 1 \dots n, n \in N^{+} \end{matrix} \right\} \tag{6.12}$$

$$Trajectory(state(0), Buffer) = \left\{ \begin{matrix} state(0) = state(0), \\ state(1) = applyMovement\left(state(0), movement(1)\right), \\ state(2) = applyMovement\left(state(1), movement(2)\right), \\ \vdots = \vdots \\ state(n-1) = applyMovement\left(state(n-2), movement(n-1)\right), \\ state(n) = applyMovement\left(state(n-1), movement(n)\right) \end{matrix} \right\} \tag{6.13}$$

$$cell.spacePortion = \dots$$

$$\left\{ point \in \mathbb{R}^3 \text{ where :} \quad \begin{pmatrix} cell.distance_{start} < & point.distance \leq & cell.distance_{end}, \\ cell.horizontal^{\circ}_{start} < & point.horizontal^{\circ} \leq & cell.horizontal^{\circ}_{end}, \\ cell.vertical^{\circ}_{start} < & point.vertical^{\circ} \leq & cell.vertical^{\circ}_{end} \end{pmatrix} \right\} \tag{6.15}$$

$$AvoidanceGrid = \left\{ \begin{matrix} i \in 1 \dots layerCount \\ cell_{i,j,k} : j \in 1 \dots horizontalCount \\ k \in 1 \dots verticalCount \end{matrix} \right\} \tag{6.20}$$

$$\forall cell_{i,j,k}, cell_{m,n,o} : cell_{i,j,k} \cap cell_{m,n,o} = \varnothing, i \neq o \vee j \neq n \vee k \neq o \tag{6.21}$$