

--{:! {move: []: (:)) step: []: (:))} <- **Move and Step Function Libraries** ->
 muse/docs/lib/motion.md

--(: motion: *Libraries to move turtles and move turtles by steps allowing operations at each step.* ->
 motion, move, step

--:+ move: **Position setting, tracking, and reporting by dead reckoning checked by fuel consumption.**

--:+ step: **Iterators (closures) for moving block by block, potentially doing operations at each block.**

--:# Provide fuel level check to validate a dead reckoning move, can track movement for retracing move as a trail.

--:+ Report error conditions "**Blocked**", "**Lost**" (for apparent but invalid movement), "**empty**" (for no fuel).

--:+ Throw some errors as tables rather than strings to allow for attempted recovery operations.

--:# **State variables for turtle motion:** (maintained across programs within session, not persistent beyond that).

--:> situation: *Dead reckoning* -> {position:position, facing:facing, fuel: situation.fuel, level: situation.level}

--:> situation.fuel: *Simulated fuel level checked against reported fuel to validate dead reckoning* -> #:

--:> situation.level: *For tracking* -> "same"|"rise"|"fall"

--:> position: *ComputerCraft co-ordinates (+x east, +y up, +z south)* -> {x: #:, y: #:, z: #:}

--:> facing: *For movement in four NESW cardinal directions* -> "north"|"east"|"south"|"west"

--:> situations: *Tracking history* -> situation[]

--:## **Some Utilities: position reporting and setting:**

--:: move.get(:situation:?) -> *Default current situation.* -> x: #:, y: #:, z: #:, facing: ":" , fuel: #:, level: ":"

--:: move.track(enable: ^:) -> *Set tracking condition* -> enable: ^:

--:: move.set(x: #:, y: #:, z: #:, f: facing?, fuel: #:??, level: ":"???) -> *Set position, optionally rest of situation.* -> nil

--:: move.situations(:situations:) -> Set **G.Muse.situations** to situations. -> situations

--:: move.clone() -> *Clone current situation* -> situation

--:: move.clones() -> Deep copy **G.Muse.situations**. -> situations

--:: move.at(:situation:?) -> (*Current*) situation xyzf. -> xyzf

--:: move.ats(:situation:?) -> (*Current*) situation position and facing string (" in game if not turtle). -> xyzf: ":"

--:: move.where(tx: #?:, ty: #?:, tz: #?:, tf: ":"?) -> *Returns GPS results if available. -> x: #:, y: #:, z: #:, facing: ":" , ^: ok*
--:+ If no GPS, returns the optional (testing) parameters or, if not supplied, current dead reckoning position in situation.

--:> recovery: *For some errors -> {call: ":" , failure: ":" , cause: ":" , remaining: #:, :xyzf:, :direction:, operation: ":"}*

--:# **Forward! Up! Down! move, step ... again (raising errors, providing for recovery)**

--:# **Tracking Movement: completing movement**

--:# **Exposed APIs for move functions: turn left|right or face cardinal if needed, then repeat count forward**

--:: move.moves(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.left(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.right(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.north(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.east(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.south(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.west(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.up(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.down(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.forward(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:: move.back(count: #?:) -> *Count 0: just turn, 1: default -> "done", remaining: #:, xyzf, direction &!recovery*

--:# **Exposed APIs for step functions: turn or face direction if needed then step count forward in that direction**

```
--:: step.steps(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--> stepping: Iterator (default 1 step) -> (): "done", remaining: #:, xyzf, direction
&!recovery

--:: step.left(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.right(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.north(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.east(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.south(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.left(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.up(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.down(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.forward(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery

--:: step.back(count: #?:) -> Iterator (default 1 step) -> (): "done", remaining: #:, xyzf,
direction &!recovery
```

--:# Move or Step to target xyzf position

--:: move.to(xyzf: xyzf, first: ":"?) -> Current situation to x, z, y, and optionally face. -> "done", #:, xyzf &!recovery

--:+ Optional argument **first** is "x", "y", or "z" to select first move in that direction to deal with blockages.

--:: step.to(xyzf:, situation:situation?) -> Step to position from (current) situation. -> (:): nil
&!recovery

--:+ Iterate first in x direction to completion, then z, and finally y. Once complete, each iterator is exhausted.

--:+ Finally turn to face if supplied. Returned iterator returns **nil** when iterators for all directions are exhausted.