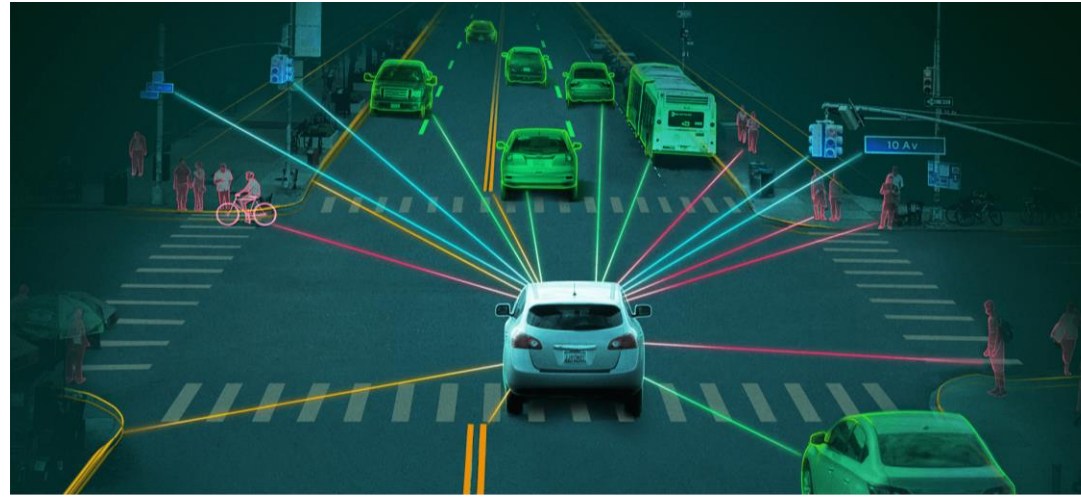


Self-Driving Cars

Complex AI Systems

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Agent Type	Performance Measure	Environment	Actuators	Sensors
Taxi driver	Safe, fast, legal, comfortable trip, maximize profits, minimize impact on other road users	Roads, other traffic, police, pedestrians, customers, weather	Steering, accelerator, brake, signal, horn, display, speech	Cameras, radar, speedometer, GPS, engine sensors, accelerometer, microphones, touchscreen

Fig 2.4, Russell & Norvig's Textbook

This agent starts at an initial state, and it **keeps moving from one state to the next** until it reaches a goal state.

**There are different
methodologies to program a
self-driving AI agent.**

Method 1: Finite State Machines

- There is a set of predefined states that the agent can be in.

**Move
Forward**

Stop

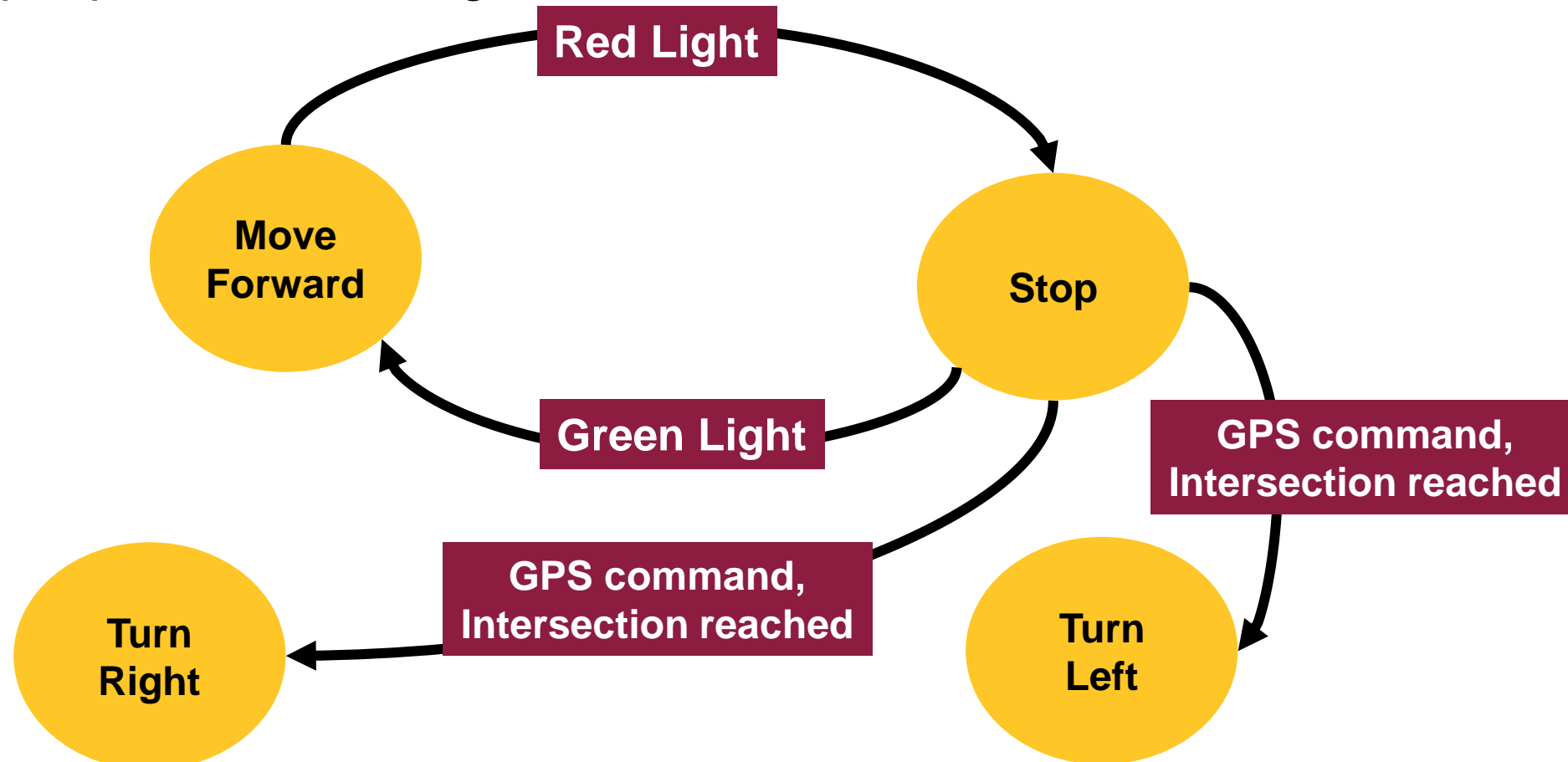
**Turn
Right**

**Turn
Left**

- The agent is programmed to take actions to switch from one state to another based on the input perceived through the sensors.

Method 1: Finite State Machines

- The agent is programmed to take actions to switch from one state to another based on the input perceived through the sensors.



Many states

**exponential input possibilities
from all sensors**

command,
on reached

A Finite State Machine method is suitable when there is a dozen or a 100 states. It becomes inefficient with increasing number of states.

mand,
reached

Method 2: Supervised Learning

- Build a dataset that holds various states, described using sensor input, and each state is associated with the correct (rational) action.

Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor n	Action
									Stop
									Signal
									Speed up
									Forward

Method 2: Supervised Learning

- Train a Decision Tree, or a Deep Learning model to estimate the action given the percepts.

Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor n	Action
									Stop
									Signal
									Speed up
									Forward

Method 2: Supervised Learning

- The more training samples, the more accurate the model becomes. ➔ *That's one reason auto-drive technology is improving over time.*

Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor n	Action
									Stop
									Signal
									Speed up
									Forward