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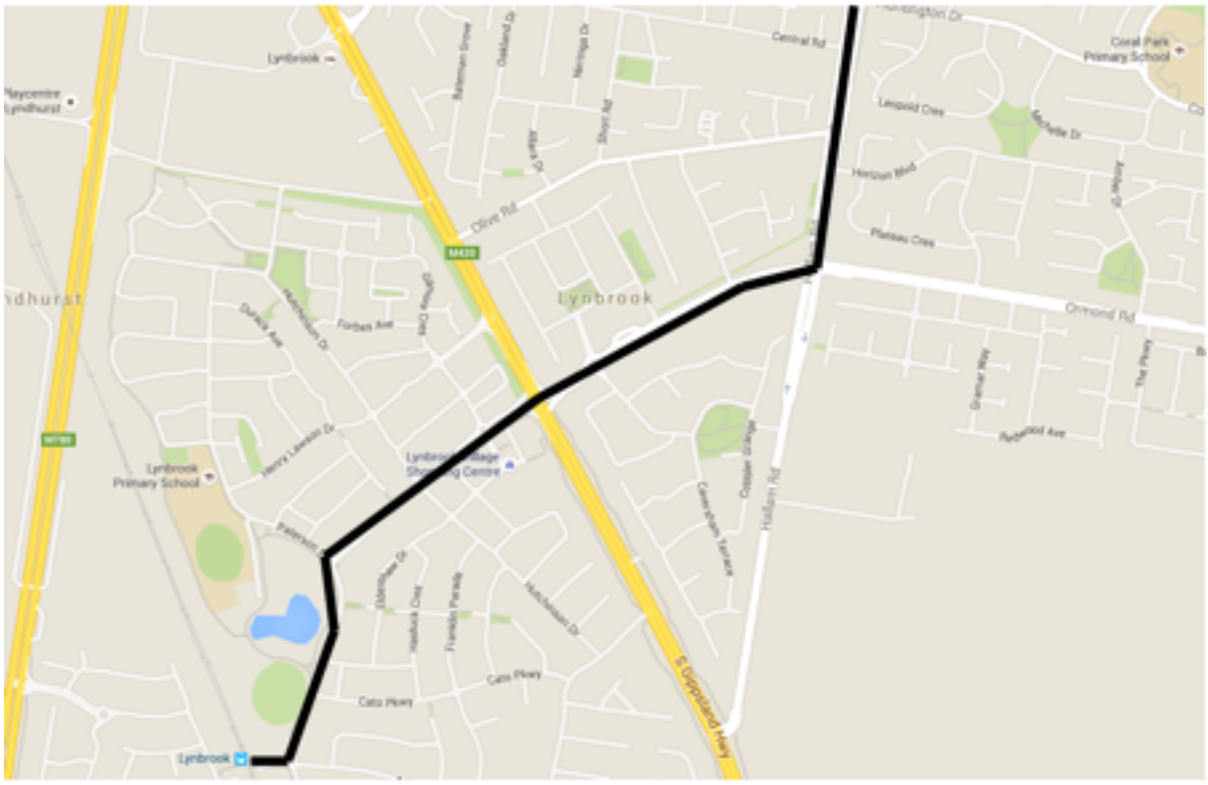
Autonomous Cars & Mass Transit

How autonomous cars might work with mass transit.

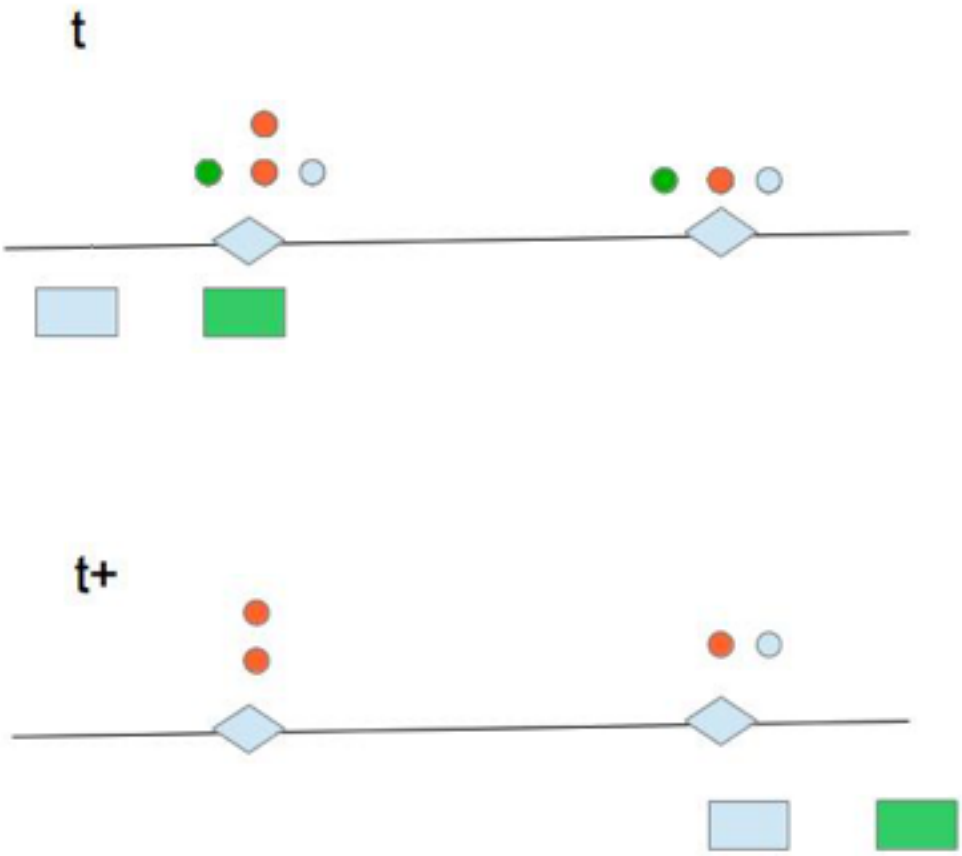
Mass transit will continue to offer the fastest way of getting people across a large city. In a suburban setting though, there is the issue of how to get to the station. You can catch a bus, which is usually quite cheap, but also usually quite slow. For a commuter with a 50 minute trip on mass transit to work, if they live more than 5km from the train station it might add another 30 minutes to the trip. This leads to very long travel times, and a strong motivation to attempt to drive the car to work.



Consider a suburban area surrounding a mass transit station. In the future the mass transit might be driverless buses down a dedicated freeway lane: the assumptions will work just as well.

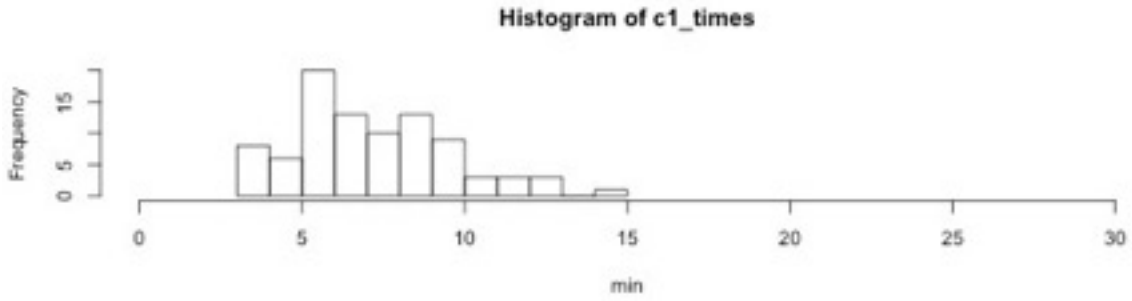
One of the main difficulties here is the tradition of transit (cheap, slow) versus the single owner car (expensive, sometimes fast). The choices are stark. What if we could provide a range of options from fast to slow, expensive to cheap? We propose here one way of doing that: three pools of autonomous cars with a varying number of passengers. One, two and four passengers. At one extreme we have the bus, at the other the single owner car, with the options between.

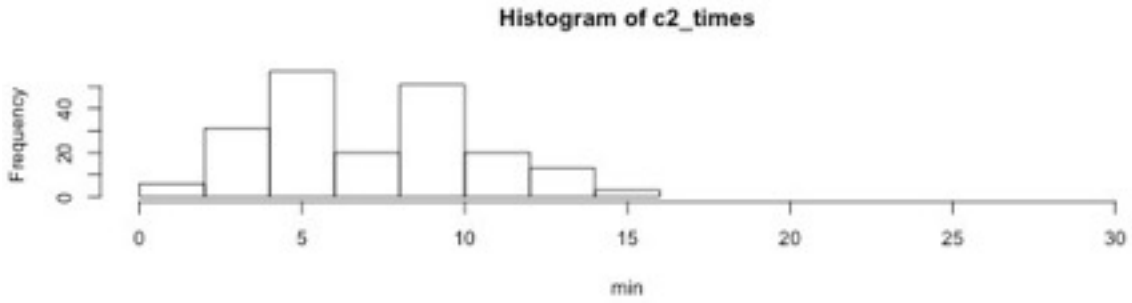
Customers can select their own tradeoff between speed and cost. To simplify, we consider a single route with 20 stops equally spaced. Passengers queue at the stop, and in turn they are served. Once selecting a type of car (1,2, or 4 passengers) they wait until a car arrives. If the car has selected them, they can board, otherwise it keeps going. Once a car is full, it continues to the station.

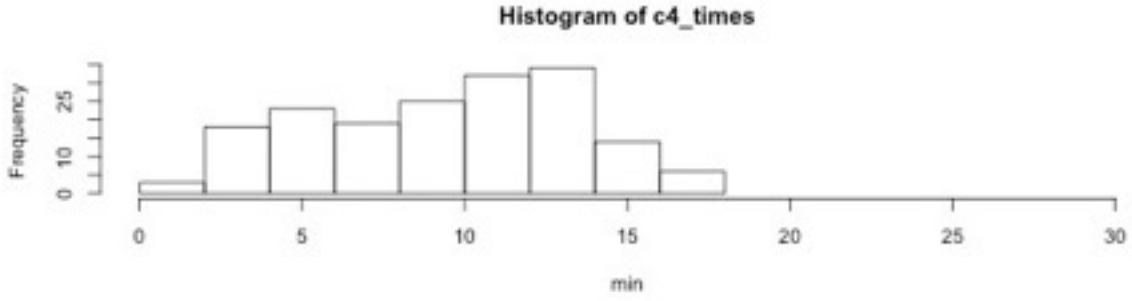


The assumptions on passenger numbers are estimated from a full capacity train departing every five minutes (2000 people) with a uniform distribution of passenger locations. Cars proceed in a loop, picking up passengers. In such a scheme, the passengers further from the station will fill all cars, leaving no room for those closer. So as a car returns, it monitors the length of queues and if it arrives at the stop with the longest queue for it's type then it reverses direction and picks up passengers.

How does this scheme perform in terms of passenger travel times?







Clearly the single passenger pickup is close to optimal, adding only a few minutes to the fastest possible time.

Having established the feasibility of this style of solution for commuters, there is more to be done. Is this a viable business? To what extent can autonomous cars substitute for single owner vehicles? Given the wide range of possibilities, it is hard to imagine a simple path. Hopefully this will invite the consideration of a wider range of possibilities than simplistic transit versus owned car, or even more simplistically public versus private ownership arguments.