

Real-Time Elevator Group Control: Destination-Call and Conventional Systems

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Algorithmic control of elevator systems has been studied for a long time. More recently, a new paradigm for elevator control has emerged. In destination call systems, the passenger specifies not only the direction of his ride, but the destination floor. Destination call systems are interesting from an optimization point of view, since more information is available earlier, which should allow improved planning. However, the real-world destination call system envisioned by our industry partner requires that each destination call (ie passenger) is assigned to a serving elevator immediately. This early assignment restricts the potential gained from the destination information. Moreover, since there is no way to specify the destination floor in the cabin, each elevator has to stop on every destination floor of an assigned call, although the passenger may not have boarded the cabin, eg due to insufficient capacity.

In this talk we introduce a new destination call control algorithm suited to this setting. Since the control algorithm for an entire elevator group has to run on embedded microcontrollers, computing resources are very scarce. Since exact optimization is not feasible on such hardware, the algorithm is an insertion heuristic using a non-trivial data structure to maintain a set of tours. To assess the performance of our algorithm, we compare it to other algorithms by simulation. We also compare to algorithms for a conventional system and a more idealized destination call system. This gives an indication of the relative potentials of these systems. The algorithm introduced is currently being implemented by our industry partner for real-world use.