Lecture 4 outline

DATA.

Video 1: The importance of data. 10 mins.

* We have seen in the previous lecture how simulation can be used, and the different ways that we can go about creating these simulations.
* We have created our own model, using hydraulic simulations.
* However, we also saw that these simulations are only as good as the data used to create them, and the appropriateness of each model type to the scenario.
* If we are going to investigate the movement of occupants of an elderly care home, it makes no sense to use data based on experiments that used students.
* This is both on the fundamental parameters, e.g. walking speed, reaction times, etc, but also on decision making, wayfinding, etc.
  + For example, many people don’t think twice about going downstairs. For an elderly person with arthritis, or low bone density, or any other of the large number of age-related degenerative diseases, this is not the case. Extreme care will be taken going downstairs, if that is done at all.
* Therefore the data used in these simulations is incredibly important. It is not constant- there are no constants in this field (yet!), and every figure used needs to be justified, and the error bounds surrounding them need to be quantified, before we can be certain of our answers.

Video 2: Emergencies. 10 mins.

* As mentioned in the last video, data is perhaps the most important feature of these models. This poses a problem when it comes to the obvious benefit of pedestrian dynamics modelling: how do we get the data for emergencies?
* To begin with, let’s discuss the nature of emergencies, because they can result in very different behaviour.
* Natural: Floods, fires, hurricanes. Often all come at once. Climate change is going to screw the pooch on this one.
* Man-made: terrorist attacks, crashes, structural failure- often all come at once.
* Urbanisation is not helping with this, as higher density cities will need higher transport capacity for peak flows. Imagine, for a second, if a hurricane were to hit London. How would London respond? Would it evacuate the city? Is that even possible? A l

Video 3: Paris 2015. 10 mins.

* Follow the same approach as Arnab’s lecture.
* DO YOU WANT TO DO THIS? You could do Hurricane Katrina instead?

Video 4: Data gathering vs data generating: Experiments. 10 mins.

* How do we create experiments to gather data on this?
  + Exploratory or specific?
  + Need to measure either a specific parameter, or
* Examples:
  + 1 dimensional flow. Gives fundamental diagrams.
  + Crossover flow. Can be used to measure crossflow.
  + Decision based experiments. Can be used for discrete decisions.
  + Hypothetical choice experiments. Can be used for discrete decisions.
  + Drills- can be used to validate software, practice evacuation methods, etc.
  + Animal experiments- can be used in stressful scenarios, but of limited validity?
  + Virtual reality- can be used to reproduce scenarios exactly, but struggles with validation.

Video 5: Data gathering vs data generating: Real world sources. 10 mins.

* Benefits of all: ecologically valid.
* Drawbacks of all: not controlled or repeatable (to an extent). Impossible to infer real parameter values, but instead get indication of what to experiment with.
* CCTV or pre-installed video cameras.
  + Can be sensitive, especially in the case of emergencies like terrorism.
  + Need to extract data to usable form.
  + Often limited views, incomplete demographics etc.
* Large scale data (e.g. GPS pings)
  + Definitely sensitive, gives a macro-scale view only.
* Social media data (twitter, Facebook check-ins)
  + Publicly available, but of limited use?

Workshop:

How would we investigate the pedestrian dynamics of a terrorist attack?