

Flows: Manifesting CO₂ Emissions

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ABSTRACT

'Flows' explores Manuel Castells theory of the Space of Flows, which relates to network society and technologies role in a new type of space. Flows bring things and people into synchronous, real-time interrelationships made up purposeful, repetitive, programmable sequences of exchange and interaction. Therefore we can define flows as consisting of three elements – the medium through which things flow, the things that flow, and the nodes among which the flows circulate. 'Flows' is a mixed media artwork that interprets these three elements through vehicles, CO₂ emission ratings data and ANPR (Automatic Number Plate Recognition) cameras, by treating the car as a data packet, whose registration plate is a portal to the Internet in the same way that QR codes or RFID are beginning to offer.

Keywords: Internet of Things, Space of Flows, Design Informatics, Big Data, Arduino, 3D Printing, Lighting & Furniture Design.

Index Terms: H.3.4 [Systems and Software]: Information Networks; H.3.5 [Online Information Services]: Web-based Services; H.5.m [Information Interfaces and Presentation]: Miscellaneous.

1 INTRODUCTION

Informatics is about structure, behaviour and interactions. It's about natural and engineered information processors. Design is about the generation, development and testing of concepts. It's about the creation of physical objects, capabilities or services. 'Flows' is an artwork by two different practitioners, a software developer and a product designer, from the new field of Design Informatics, which is the intersection of conceptual thinking, design and data. By understanding that objects are as much representations of an immaterial system that begin and end as data (Sterling 2005), as they are material form, we can harness massive connectivity, analytic power and industrial-strength simulation to design tangible products and intangible services to support the augmented society; just as virtual reality is blending into augmented reality, the digital economy and the information society will evolve into the augmented society.

2 THEORETICAL CONTEXT

'Flows' is situated in the context of the Internet of Cars. Proposed by Speed & Shingleton in their paper, Manifesting Flow: An Internet of Cars, the vision of an Internet of Cars is located within the emerging technical and cultural phenomenon known as 'The Internet of Things (IoT)', Attributed to the Auto-ID research group at MIT in 1999 (Ashton), it refers to the technical and cultural shift anticipated as society moves towards a ubiquitous form of computing that facilitates the connection of everyday

objects and devices to all kinds of networks. The analog bar code that has for so long been a dumb, encrypted reference to a shop's inventory system will be superseded by an open platform in which every object manufactured will be traceable from producer to distributor, and potentially every single person who comes into contact with it following its purchase. Further still, every object that comes close to another object, and is within range of a reader, could also be logged on a database and used to find correlations between owners, environmental conditions and applications.

Speed & Shingleton suggested that a technically determinist vision of tags and codes appeared to be obscuring an opportunity to fold existing 'things' into an Internet for traffic. Cars are the single most visual form of actual moving data that we know and yet they are wholly overlooked as packets of data that interface with humans, businesses and the environment. Car registration plates can be used as unique identifiers in the same way as barcodes and offer a platform for people to store data on to them, use them as interfaces to social networks, pass messages between people, and connect to data.



Figure 1: IoT: Barcodes, QR Codes, RFID and Registration Plates.

Dynamic, fluid and representing individual packets of information within a UK wide network, cars could be critical components within the emerging phenomenon known as the Internet of Things. Each one tagged with a unique identifier that is scannable with smart phones, as well as the highly sophisticated roadside cameras, cars with their number plates have been the equivalent of barcodes on supermarkets products for many years. In this way cars are turned into networked artefacts that provide the missing link in connecting the flow of things to people, artefacts environments and businesses. The ability to tag a vehicle's registration plate with information to allow others to read at various points in the future offers a potentially new way of disseminating not only traffic information (journey times, congestion/incident hotspots), but data on weather/road conditions, special events, and user relevant offers.

'Flows' explores the experimental use of cars as a manifestation of flow across social networks. Manuel Castells first proposed the theory of the Space of Flows, in *The Rise of the Network Society* (1996), and it relates to network society and technologies role in a new type of space. Flows bring things and people into synchronous, real-time interrelationships made up purposeful, repetitive, programmable sequences of exchange and interaction. Therefore we can define flows as consisting of three elements – the medium through which things flow, the things that flow, and the nodes among which the flows circulate. 'Flows' interprets these three elements through vehicles, CO₂ emission ratings data and the A354's ANPR cameras.

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3 ARTWORK

Approximately 40000 cars are recorded everyday on the A354 between Dorchester and Weymouth. Through the use of a vehicle lookup enquiry, a service you might use when purchasing a car, one can ascertain detailed information about the vehicle including make, model, fuel type, engine size, and CO₂ output.

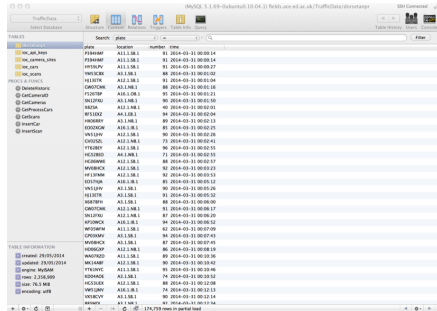


Figure 2: Extract of ANPR Data.

'Flows' as an artwork uses the information held on the CO₂ output of each vehicle passing through one of six Automatic Number Plate Recognition sites on the A354, and converts the total amount of carbon dioxide being emitted on the stretch of road into a physical data representation. Each one of the acrylic tubes represents a position along the A354, and drawing reference from the Emissions Ratings Charts, they are lit to correspond to the heaviest polluting site. As CO₂ is completely immaterial substance, fans are also driven off the data to move particles in the tubes, with a higher velocity indicating a greater output of CO₂ at that site. All of these calculations are done in real-time, and the output is a live representation of the material traffic flow along the A354, and the corresponding immaterial environmental impact.

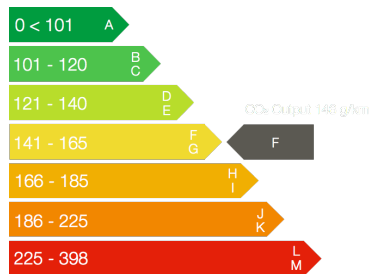


Figure 3: Vehicle CO₂ Emission Ratings.

This superficially simple project encompasses a range of technologies from physical computing, Big Data and 3D printing to lighting and furniture design all to the end of revealing the invisible. Ironically the design of the piece conceals its own inner workings though this was not understood until the making neared completion and the beauty of the internal components became apparent. But this beauty was not entirely accidental - designers obsess about details and the symmetry, rhythm and custom-made, contrasting CAT 5 cables are no accident.

There is a clear tension between the goal of visualising CO₂ emissions and the desire to conceal the mechanism of this visualisation so the decision to expose and demystify the internals, leaving the bottom panel off and placing mirrors on the floor, feels like breaking the 4th Wall or breaching the Magician's Code.

In the spirit of revealing the hidden it is justified to expose the internals, showing how the magic is created, and at the same time declaring there is a place for beautiful craft in Design Informatics projects.

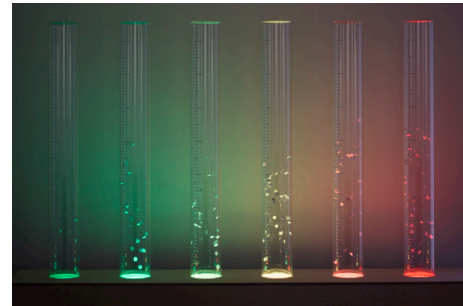


Figure 4: Flows CO₂ emissions representation

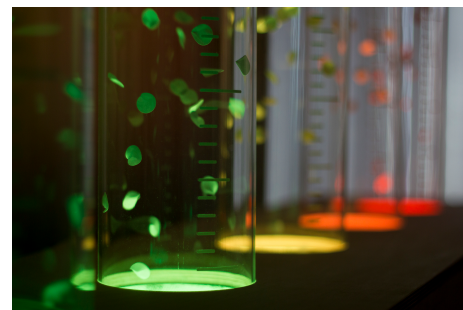


Figure 5: Flows close-up



Figure 6: Arduino controlled fans and 3D printed housing

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