

# the bubbles of Radio



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## Introduction/ Brief

Touch is a research project, led by Timo Arnall at the Oslo School of Design & Architecture (AHO), that investigates “the interfaces between mobile phones and physical objects through a technology called Radio Frequency IDentification (RFID)”.  
For more information, please visit [www.nearfield.org](http://www.nearfield.org).

The Tangible Interactions course at AHO links closely to the Touch project, and through the spring semester 2007 students have worked on various Touch relevant briefs. The Landscape of Radio, which is the brief chosen for the project presented here, focuses on the invisible bubbles of radio magnetism, created by the ‘ubiquitous’ use of wireless communication that increasingly fills our physical environment. It aims at investigating possibilities for systems that lets us know when we are in a particular kind of field, and what functions, applications and services that field may offer.

Chosen Brief - The Landscape of Radio - as described at [www.nearfield.org](http://www.nearfield.org)

*“With the increasing ‘ubiquitous’ use of wireless communications, the physical world is filling up with bubbles of radio waves, from massive GSM, 3G and wi-fi networks to tiny RFID pinging out their ID numbers. Each of these invisible bubbles offers a set of functions or services, from talking on the phone to transferring data or granting access or paying for a ticket.*

*This is a central issue for ubiquitous computing where computation is embedded, often invisibly into the environment. Knowing what kinds of fields are available (wi-fi, Bluetooth, rfid, etc.) and knowing what kinds of functions, applications or services they offer may be a central usability problem in the near future. Can we design systems that let us know when we are in a particular kind of field, what we might do in those fields and what information we give up to them? The project should look at the previous work of Dunne & Raby, particularly ‘Hertzian Tales’, as well as the research work on ‘seamful’ interactions by Chalmers et al.”*

This brief can be taken in many directions, and I decided to try to visualise technology, serving the purpose either as helpful information or warning.

The latter is due to the great scepticism and following engagement shown by groups and organisations world wide towards new technologies - RFID in particular as this is the focus of the Touch project. There seems to exist a fear of technology among a lot of people, either as a tool of potential power misuse, or because of its yet unknown physical effects on the human body.

The way in which I’ve solved the task is not realistic, yet it’s based on real facts and specifications. In that light the result is more tongue-in-cheek and artistic, than scientific and practical.

## Context of Ubiquitous Computing & Electromagnetic Waves

### Fear

Over the semester I finished reading the book *Everyware* by Adam Greenfield. He very thoroughly breaks down what he thinks it will mean to have wireless communication implemented in every thinkable and unthinkable place in our everyday lives, and what responsibility rests on designers and developers of such systems. He may well glide towards the unreasonably sceptical at times, but raises some interesting questions, and foresees a lot of equally interesting problems that will likely need addressing whether irrational or not.

Some of the concerns he raises are shared in numerous anti-RFID web sites who seem mainly worried about the power of the big corporations. As consumers, we are being monitored, our habits traced and manipulated, and eventually shaped into a mainstream social frame. Further, it is predicted that those of us who do not fit into this mould will be discriminatingly locked out of the whole social system. Not unlike George Orwell's dark visions of the future in his book *1984*. New technologies are seen mainly as future threats as inevitably they will fall on the wrong hands, get misused and ultimately deprive us of our human rights.

There are also strong concerns as to whether wireless communication actually presents a physical threat to the human body and bodily tissues. The debate seems to currently be concerned mainly with wi-fi networks, as well as radiation from mobile phones which has been a hot topic for years. As Guy Kewney writes in his article *Can we have a proper study of Wi-Fi please?* the technology for one thing is not old enough to have created patterns over time, and scientific proof has yet to be produced that wireless technology has any physical effect on us, or is harmful in any other way.

An interesting side issue here of course is perceived pains and illnesses people blame radiation to cause. The mere stress that myths and beliefs can cause should not be entirely overlooked.

Whether or not one chooses to agree to all this, I do think it important to keep these less popular opinions in mind during the creative process. Designers and developers are generally very positive and enthusiastic about new technologies. Rather than just brushing off the critics as irrational, they might contribute new interesting things. As an example they clearly have a sense for spotting system bugs long before the technology is here.

### Critical Comments, Awareness and Interaction

The project *Hertzian Tales* by Anthony Dunne and Fiona Rabys looks at peoples relationships with new technologies. Their design projects are critical to the way we think of technology (among other things), and often aim to - rather than being purely practical - provoke reactions, and to make the viewer think. Dunne and Raby use design as critical comment.

Wireless communication technologies in various forms have been widely explored in art and design projects. Cell phone disco is an interactive wall, with lots of LEDs on it that lights up when you walk past it with an active mobile phone. While mainly fun, beautiful, and even magical, it does raise thoughts as to what is going on between the phone and the sensors embedded in the wall.

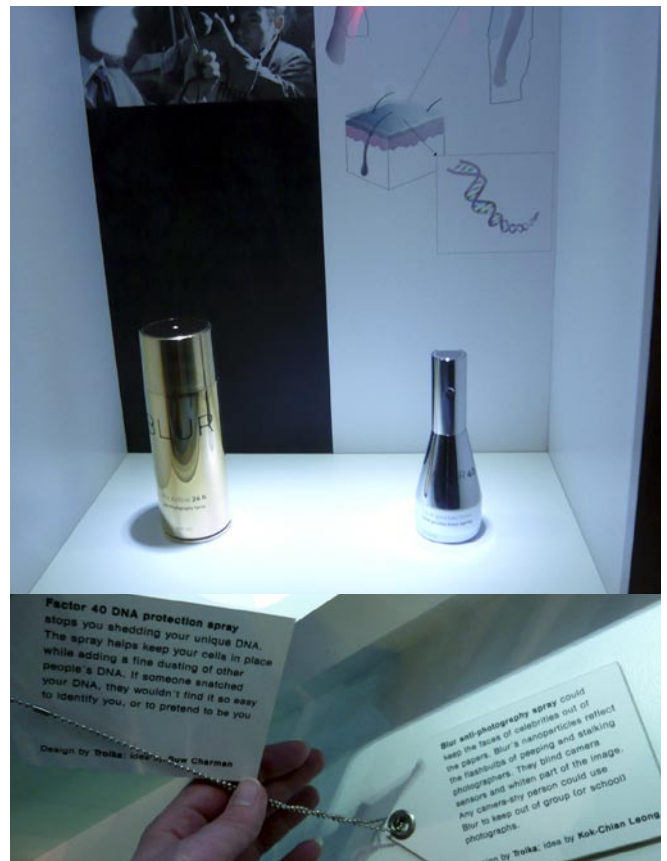


Tool for hearing electronic objects "talk" from *Electroprobes*, and *Cell Phone Disco*. Images from the websites.

In such installations the viewer often gets to interact with the piece. As anthropologist Anne Galloway pointed out during her visit to AHO at the middle of the semester, observations in those instances may be just as useful as any other function the product may have.

Interacting and playing with new technologies can be an excellent way of 'breaking the ice' in the process of familiarising it.

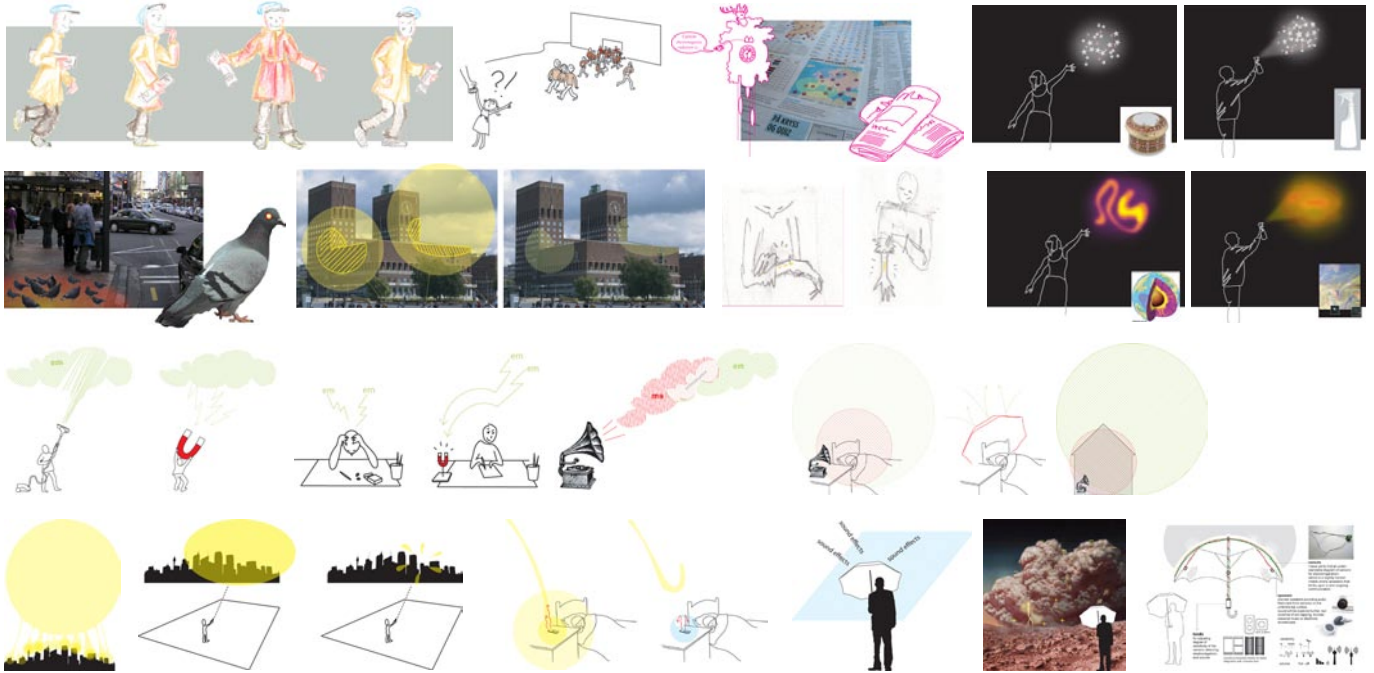
In May this year, the class went to London, where among other things we visited the Science Museum and the SPY exhibition they had on at the time. In a section called Future Lab were projects by renowned designers (among others Dunne & Raby) who had spotted a need and designed solutions to them. Inspirational as to how effective well good evidencing works.



Works by Dunne and Raby, and by Studio Troika, in the Future Lab.

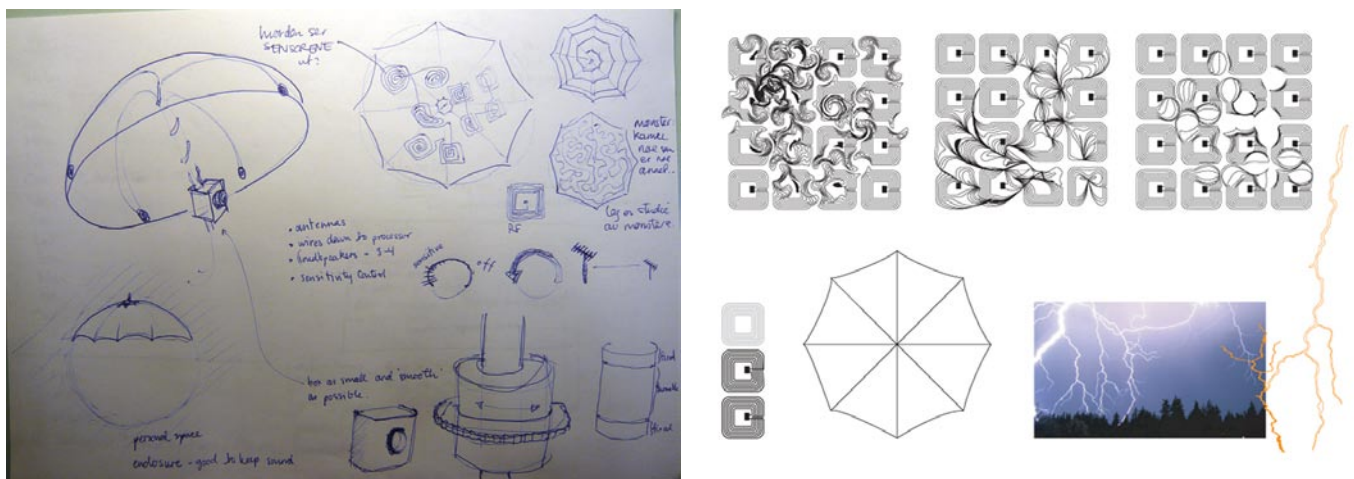
## Process

My first concepts looked at different ways of showing that there is technology invisibly present, as a form of signage. As I visualised the ideas, it became easier to group them; some were nearly overlapping and others completely different. There were details in the visualisations (conscious or not) that would trigger associations and further development or new directions. Some also stood out as more interesting than others.



*Various versions of displaying electromagnetic presence. Solutions for trapping or neutralising fields, and feed-back umbrella.*

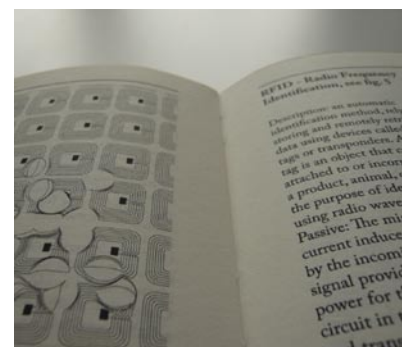
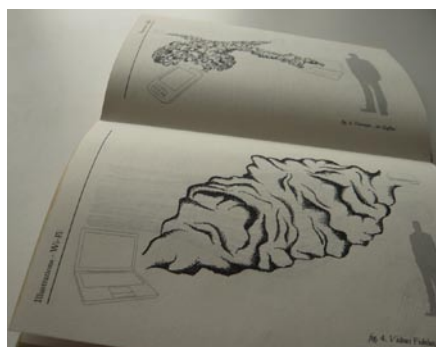
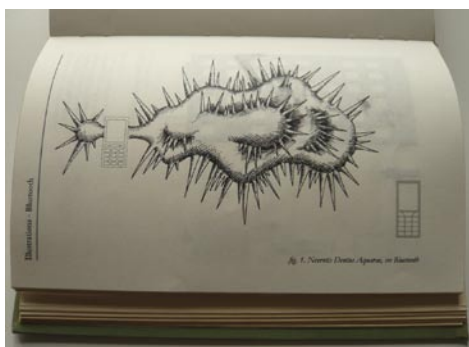
In a sketch for the umbrella as a sensor, I suggested to wrap out the copper coil found in antennas and recoil it in patterns covering the umbrellas surface. While the umbrella idea eventually went, the patterns stayed and evolved into subtle indication of electromagnetic presence and an alternative to regular signs.

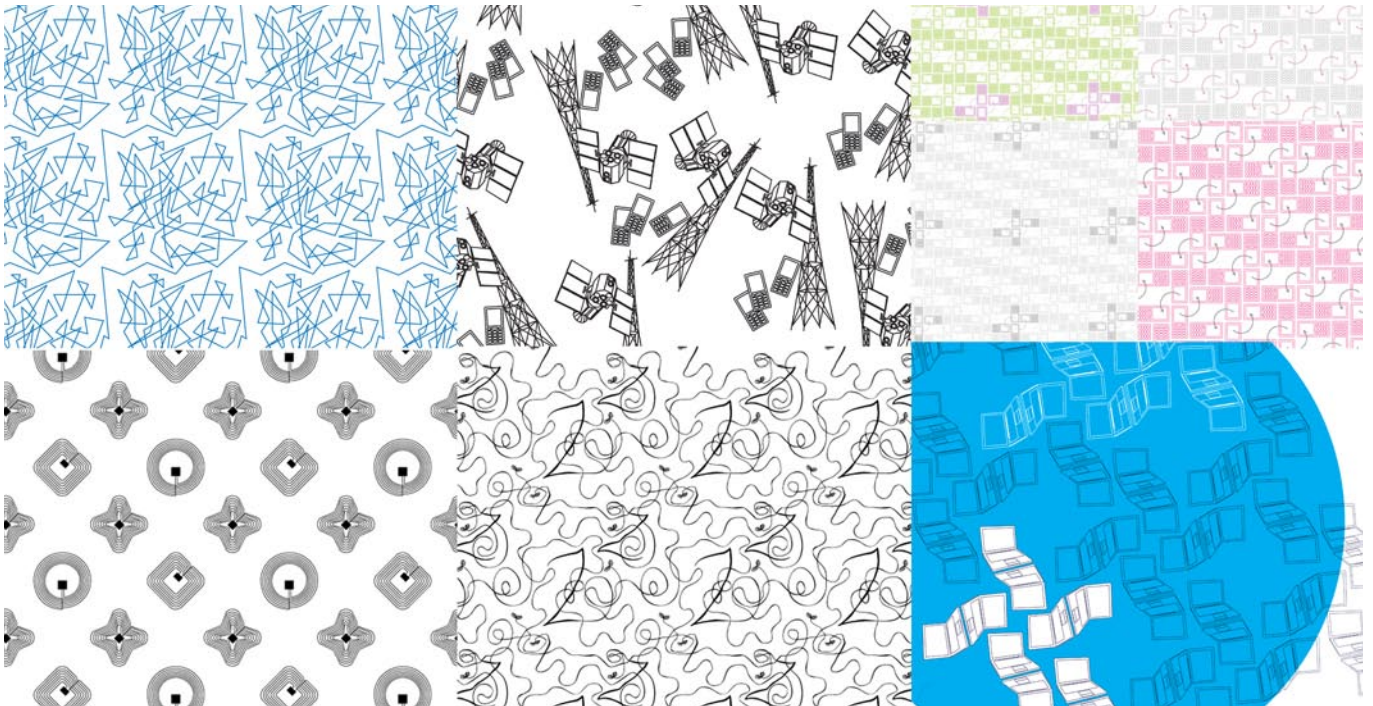




## Result/ Flora and Patterns

The two ideas came together as a book and a set of patterns, each illustrating the 'bubbles of radio' in their own way. The Flora is a 'fake' encyclopedia of electromagnetic fields, with a main focus on wireless communication. It includes descriptions and elaborate illustrations of six chosen networks; Bluetooth, Digital Multimedia Broadcasting, Global System for Mobilecommunication, Radio Frequency Identification, Wi-Fi and ZigBee.





*Some of the patterns, intended to represent Bluetooth, DBM, GSM, RFID, ZigBee and Wi-Fi. If I had had more time, I would have made animations with the patterns for the mobile phone as EM compass concept.*

There are many opportunities for where and what these patterns can be applied to. I was not satisfied with the extent to which I got to explore this, and will therefore not attempt to present supposedly final solutions. Nearly returning to some of the early ideas, they could be applied to buildings, interior as well as exterior, and painted onto streets. They could be printed on fabric, for clothes and accessories, from handbags, umbrellas, to coats, linings and even underwear. They could be applied to domestic objects that are used near electromagnetic fields; apron for the microwave, cloth for the TV or telephone table, curtains for the windows facing the nearest mobile communication antenna, to mention a few.

## Conclusion

About what I say in the Flora on wishing to trigger a discussion; this may have been a great topic to discuss in the 'Stigostæin' creativity workshop had I only been at that stage at that time. Ideally, I had allowed myself to be less critical to the individual ideas in the beginning, in order to just get ahead with producing visuals and evidencing. I will certainly keep this in mind for future projects. I also need to improve my judgement of good versus bad ideas. At the time of this project everything was a bad idea, I found myself depending on other people's feedback (naturally very varying!), which is not a good foundation for further investigation and development.

Whether it was lack of confidence in my ideas or delaying decisions that were my greatest headaches, I wish I had more time for the finishing touches. I am not unhappy with the end result. I had many ideas that would have been interesting to push further before throwing them away, but it was necessary towards the end to make slightly more hurried decisions than I prefer.

If I was to do this project again I would have started writing this project documentation at a much earlier stage, if not from the very beginning. Through the semester I have become much more comfortable using my blog too, and I suppose the documentation would take place there.

## References

### Brief / intro

[www.nearfield.org](http://www.nearfield.org)  
[www.foebud.org](http://www.foebud.org)  
[www.nocards.org](http://www.nocards.org)  
[www.lessemf.com](http://www.lessemf.com)  
 article can we have some evidence please?  
 + about wifi in schools good and bad..  
[www.immelie.wordpress.com](http://www.immelie.wordpress.com)

### Contextual research

#### Fear

Everywhere by Adam Greenfield, New Riders & AIGA, 2006  
[www.foebud.org](http://www.foebud.org)  
 Can we have a *proper* study of Wi-Fi please?:

[http://www.theregister.co.uk/2007/05/22/wifi\\_science\\_bunk/](http://www.theregister.co.uk/2007/05/22/wifi_science_bunk/)

#### Critical Comments..

Hertzian Tales, A. Dunne, RCA CRD Research Publications, 1999  
[www.dunneandraby.co.uk](http://www.dunneandraby.co.uk)

### Process

Frequency list: [http://test1.contenttest.net/Frequenzplan\\_en.shtml](http://test1.contenttest.net/Frequenzplan_en.shtml)

### Other links

#### Harmfulness of technology discussed in the media

“My war on electro-smog”: <http://environment.independent.co.uk/lifestyle/article2600308.ece>

Anti radiation invention reviewed: <http://www.badsience.net/?p=413>

“BBC shredded on bad science in WiFi scare report”:

[http://www.boingboing.net/2007/05/26/bbc\\_shredded\\_on\\_bad\\_.html](http://www.boingboing.net/2007/05/26/bbc_shredded_on_bad_.html)

How Bad Can Wi-Fi be?/ “good-thing-we-have-real-experts-here”:

<http://ask.slashdot.org/article.pl?sid=07/05/22/1230231>

Can we have a *proper* study of Wi-Fi please?:

[http://www.theregister.co.uk/2007/05/22/wifi\\_science\\_bunk/](http://www.theregister.co.uk/2007/05/22/wifi_science_bunk/)

BBC NewsWatch on Panorama’s WiFi episode: <http://www.youtube.com/watch?v=flKosgr8IN4>

Evil Bluetooth/ “Real Hustle Bluesnarfing”: <http://www.youtube.com/watch?v=dltjEnrePxc>

Gadget allergy: <http://www.telegraph.co.uk/news/main.jhtml;jsessionid=TIWNKYI4D53YRQFIQMFSFFOAVCBQ0IV0?xml=/news/2006/08/26/ngadgets26.xml>

Electricity sickness: <http://www.telegraph.co.uk/news/main.jhtml;jsessionid=YX2TLPUUJ0J2NQFIQMFSFFOAVCBQ0IV0?xml=/news/2005/01/24/nelec24.xml>

#### Art/ design projects/ tech events

Electroprobes: [www.troika.uk.com/electroprobes.htm](http://www.troika.uk.com/electroprobes.htm)

Cell Phone Disco: [www.cellphonedisco.informationlab.org](http://www.cellphonedisco.informationlab.org)

Photos of Wi-Fi space: <http://www.we-make-money-not-art.com/archives/008888.php>

Ætherspace: <http://zeitkunst.org/projects/aetherspace/>

Interactive Umbrella: [www.pileus.net](http://www.pileus.net)

Usman Haque: [www.haque.co.uk](http://www.haque.co.uk)

Dunne & Raby: [www.dunneandraby.co.uk/designing/hertzian/hertzian.html](http://www.dunneandraby.co.uk/designing/hertzian/hertzian.html)

Tin foil hat community: <http://people.csail.mit.edu/rahimi/helmet/>

SPY Exhibition: [www.scienceofspying.com](http://www.scienceofspying.com)

Review of "Waves", an Art + Communication festival in Riga, +READ THE COMMENT!:

<http://www.metamute.org/en/When-Wireless-Dreams-Come-True>

The Waves website: <http://rixc.lv/06/>

Enter - digital media event: <http://www.enternet.org.uk/enternet/home.acds>

### **Anti Sites**

C.A.S.P.I.A.N: <http://www.nocards.org/>

Block EMF: <http://www.blockemf.com/>

Paraben Forensic Tools: [http://www.paraben-forensics.com/catalog/product\\_info.php](http://www.paraben-forensics.com/catalog/product_info.php)

The EMF safety super store: <http://www.lessemf.com/>

Magnetic Fields and Childhood Leukaemia (Pooled Analysis, 2000):

[http://www.hpa.org.uk/radiation/understand/information\\_sheets/magnetic\\_fields.htm](http://www.hpa.org.uk/radiation/understand/information_sheets/magnetic_fields.htm)

### **Technicalities/ Visualisations**

EMF metre: [http://en.wikipedia.org/wiki/EMF\\_Meter](http://en.wikipedia.org/wiki/EMF_Meter)

How antenna fields look: [http://www.radiowavz.com/html/antennas\\_and\\_propagation.HTM](http://www.radiowavz.com/html/antennas_and_propagation.HTM)

<http://www.nearfield.org/2006/08/phantom-geometry-and-tissue-simulant-liquids>

Frequency Usage Chart for Germany: [http://test1.contenttest.net/Frequenzplan\\_en.shtml](http://test1.contenttest.net/Frequenzplan_en.shtml)

Electromagnetism: <http://en.wikipedia.org/wiki/Electromagnetism>

Electromagnetic Radiation: [http://en.wikipedia.org/wiki/Electromagnetic\\_radiation](http://en.wikipedia.org/wiki/Electromagnetic_radiation)

The Electromagnetic Spectrum: [http://en.wikipedia.org/wiki/Electromagnetic\\_spectrum](http://en.wikipedia.org/wiki/Electromagnetic_spectrum)

The Electromagnetic Spectrum:

[http://www.ccsc.k12.in.us/~sabromavage/Sun\\_Moon\\_Earth\\_test\\_2006](http://www.ccsc.k12.in.us/~sabromavage/Sun_Moon_Earth_test_2006)

Bluetooth & WLAN:

<http://www.eurescom.de/~pub-deliverables/P1100-series/P1118/D3/BLTandWLAN.html>

Visualisations of various digital media networks: <http://www.geosimulation.org/pictures/>

EMF Absorption by the body:

[http://www.hpa.org.uk/radiation/understand/information\\_sheets/emf\\_modelling.htm](http://www.hpa.org.uk/radiation/understand/information_sheets/emf_modelling.htm)