

SMART.mat Design workshop - brainstorming session

Product ideas arising from the workshop

Safety

Measuring	Rucksack and luggage weight detection
	Temperature sensors in hostile environments (4) General . Furnace . Rugged . Cryogenic .
	Fault finding hot spots
	Electrical cable – 3 core fault detection
Controlling	Neck restraints (2)
	Colour change to more reflective colours by heat (VO2 IR)
	Electro-luminescence in a bike to make brighter
	Sense & correct subsidence ‘smart foundations’ (2) Change of glass reflectivity
Warning	Low cost food temperature check – eg BBQ chicken (2)
	UV Exposure
	Visibility of safety due to colour
	Surface temperature warning – table tops
	Warning for over exposure to light/heat i.e. sun cream
	Warning of overheating i.e. food / Undercooking / eggs
	Monitoring cooking pots – remote alarms
	Packaging warning – “out of date”
	Steering wheel grip – sleep alert via grip strength
Warnings on cookers/saucepans	
Interacting	Packaging safety interlocks – adults ‘v’ children Child resistant packaging (medicines)
	Road safety – light up clothes for children/elderly
	Interlocks – stroke in certain way to open (child locks)
Hygiene	Hospitals have key need for antibacterial environment
	All aspects of kitchens and bathrooms could be made anti-bacterial
	Anti-bacterial surface important for door handles
	Could anti-odour or dirt hair products be developed
	Stay clean wool
	Coat front of wallpaper to prevent staining Hydrophobic Hydrophilic Both
	Water repellent paper, where likely to be spilt on
Table cloth fabric feels nice but stays clean	

Medical

Control	Hearing aids – vibration to sound (cf microphone) using skull – bone conduction
	Thermal comfort
	Body temperature – Exposure & Hypothermia
	Pressure dressings – burns
	Medicines – insulin
Measuring	Stress relief
	Monitoring human movement i.e. on aeroplanes prompt to do exercises
	Imaging method for joint inflammation
	Indication of hot spots – patient care in hospital
	Responses to body temperature as a thermometer
	Muscle quantification (physiology)
	Blood pressure sleeve (fabric + EAP) to give more info than just pressure
	Direct measurement of muscle power (e.g. after stroke rehabilitation)
	Pressure distribution real-time – cot mattress
Manual handling sensors – detect RSI issues	
Measure children’s activity levels	

Security

Domestic	Alarmed carpets
	Monitoring sheltered housing – falls place of help alarms
Personal	Burglary alarms – flashing lights
	ID chip/sensor so don’t forget purse/keys (traces if stolen)
	Interlocks – stroke in certain way to open (jewellery box)

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	Anti pick pocket device (paired chips talk to each other)
	'Signature' intuitive interfaces
Policing	Child safety – monitor intruding adults
	Monitoring human movement i.e. on aeroplanes air rage
	Lie detector via gripped unit containing conductive thread

Sports and Leisure

Sport	'Thinking' sails – self trimming
	Sport contact sensing e.g. fencing – but better than current
	Swimwear and wetsuits could be water repellent for performance and comfort
	Tennis swing monitoring – use EAP to detect motion and force
Leisure	Swimming pool lining colour
	Kite/parachute fabric shape change with less control wires
	Getting tactile feedback from Eleksen material (e.g. keyboard)
	Dance mats/interactive Christmas lights
	Nightclub clothing changes to beat
	Colour change fabric, tents change colour throughout the day
	Performance art – dancer interaction
	Fretboard pressure for new guitar
	Auxetic structures (tents)
	Cancel unwanted speaker vibration
Tactile interface 'stroke' control – like a pet	

Education

General	Seats for interactive exhibits – story telling
	Thermochromic paint – Innovation
	Thermochromic paint - Hands on understanding
	Thermochromic paint - Inter friendly information
	Creative drawing tool – using hair dryers
	Thermochromic paint - End user involvement
Games	Interactive colour change – games
Development	Learning environment to encourage interaction
	Encourage children to eat by colour change cutlery/crockery
	Thermochromic paint – Educational material
	Sensory rooms to stimulate people
	Disabled access – toys music – tactile keyboard

Fashion and living

Accessories	Mood nail polish/makeup
	Jewellery
	Automatic umbrella
	Colour change by electrical current – mobile phones
Clothing	Could we develop a water retaining fabric
	Integration with fabrics for fashion
	Shape memory foams for garments
	Ironing shape sensitive garments
	One size fits all
	Customised shoes – Auxetic – SMA wires
	Decorative applications in garments
	Auxetic garments
	Shoes that respond to temperature
	Embroidery thread
Is there a market for sweat invisible clothing	
Food	Clamping systems – food white ware moulds
	Packaging – change food temperature
	Adhesives – temperature activation
	Packaging changing colour
Indoors goes outdoors	Treatments of many things to allow exhibitions to be held outside
	Indoor / outdoor products could now be comfort of indoor, rather than limited
	Outdoor carpets can now be Axminster quality

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Interiors

Personalities	Personalisation – foot falls control light/sound via carpet
	Mood carpet – lights and music
	Glass – stained glass effect to give multiple properties
	Mood indicator – internal house colour
Decorative	Welcome mat – automatic light switch on
	Thermochromic wallpaper
	Change the ambience of a room/exterior with temperature
	Thermo-phonic – colour change in response to sound
	Furniture that changes shape
	Short term change – decorative covering
Functional	Thermochromic paint - Seating – Interior
	Blinds and window screen partitions
	Mechanisms for heating
	Coat reverse of wallpaper to prevent damp ingress
	Can water repellent properties be built into paint
	Interior paint to check for insulation
	Change of glass reflectivity
	Vases / liquid containers could be made from paper
	Water proofing lace or valuable material
	Radiator paint
Textile actuators – shape shifting walls/fashion	
Cushion or sofa to control – TV, lights, home etc (sorry I couldn't resist!! – couldn't find any proper ones)	

Structures

Monitor	Stress measurements – bridges etc
	Fire detection sensors
Control	Change of glass reflectivity
	Automatic opening vents
	Mechanisms for heating
	Adhesives – temperature activation
	Walkways to generate electricity
	Earthquake proofing old buildings
	Interactive advertising
Vibration damping of buildings	
New designs	Multi-functional structures such as Shape change to reveal other features
	Honeycomb – combined expansion and change colour
	Shape changing sculptures
	Temporary structures using shape memory
	Auxetic temperature structures
Combination of SMA and Auxetic structures	

Transport

User	Built in car jack – powered by car battery
	Car seat liners
	Glass – car windows – privacy by colour change
Mechanics	Rivets and ease of disassembly (end of life)
	Sealing at sub zero temperature – aircrafts
	Body panel repair template

Materials issues

Can repellency be controlled to give selective adsorption (like a membrane / filter)
Differential appearance on clothing by having water repellent / attracting zones on fabric
A pre-treatment on textiles which print poorly to hold print
Use traditional materials (e.g. Hessian) to have performance (waterproofness) of modern textiles

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Questions arising from the workshop

Need for a central focal point to suggest undergrad projects – with prizes?

Could establish a central smart materials database?

Establish market need?

Point of contact?

Seed corn projects?

Tangible materials library to allow hands on access?

What ranges of colours are available?

Can the colour change be regulated?

Links to suppliers?

What forms can thermochromic come in?

- Paint
- Ceramic
- Fibre

Responses on the questions

Regarding the seedcorn projects, SMART.mat are finalising the way in which these will work. This will be published on the web-page and announced in the newsletter that is sent to all SMART.mat members.

There are no plans to have a stock of smart materials. If materials are needed, contact SMART.mat.

If there is a specific need for information, SMART.mat can put people in touch either with suppliers or experts in this field. Above and beyond that, discussions are ongoing within the network concerning development of a smart materials database. This will provide information about suppliers, behaviours and specifications of a wide range of smart materials.