

## Zero G° Choreographies

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### Reflection

*What if physical interaction in zero gravity was an everyday occurrence?* The research artefact is an initial gesture towards a complex adaptive system of coded nonverbal communication expressing movement. The capacity of the material to change colour based on reflective angle allows for exciting opportunities for understanding where others are at, how fast are they traveling and if you are going to collide. Relations between bodies in zero g° environments require new choreographies as kinetic interaction is fundamental to conducting everyday activities.

Opening with an interaction between participants, dance and materials, the focus of *Everyday Futures* -- relationships and possibilities between the body, materials and things - was established.



Later in the day, a rapid ideation and making workshop expanded the potentials of materials as drivers for narrative and design development. These initial workshops offered touch points for the concept and prototype development to follow. Significantly, they framed a making practice within a strictly limited time frame, rapid decision making and iterative narrative building, foregrounding the conditions for the teamwork of the following day.

The time allocation of one day for concept development, narrative and prototype production and completion seemed at the outset somewhat challenging. For this time limit to work it demanded considerable trust in the process, and a rapid mining of collaborative skills and resources. Once underway this process generated its own momentum.

The morning began with a brief return to our original proposals traversing the pragmatics as well as the blue-sky possibilities of intersecting interests. These included physical mobility and the garment/wearable technology as interface between body and environment (particularly when engaged in activities such as walking and cycling and how we might better understand how the mobile body negotiates and experiences a range of atmospheric conditions within urban public space).

Our discussion rapidly moved across these interests --considering how an individual's awareness of their own movement dynamics can be expanded through the feedback loop of a sensing garment, and how responsive garments might have the capacity to augment and condition these dynamics with an expanded capacity for nonverbal communication. From a close focus on the body's negotiation of the gravitational constraints of environmental conditions the conversation reached a turning point when we speculated on the conditions and potential realities of its converse- the zero gravity environment of space.

This radical alteration of limitations imposed an entirely new order and opened up the possibility for an alternative narrative - one of the floating body liberated from gravitational constraints, but now reliant on an entirely new set of physical dynamics for determining intended directional movement. A speculative narrative/scenario of an enclosed gravity free environment in space, (the body now freed from its relationship to gravity and ground) enabled a new way of thinking about the physics of body movement, energy and relationships to other bodies in this environment. This scenario gave rise to the need for an *augmented body skin* - a complex neurologically sensing wearable interface that could code and communicate velocity, position, proximity, distance, direction, and intention.

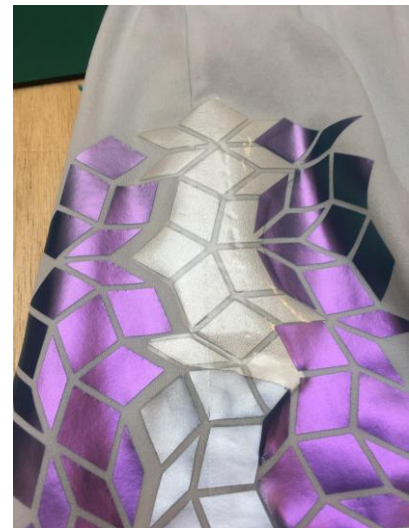
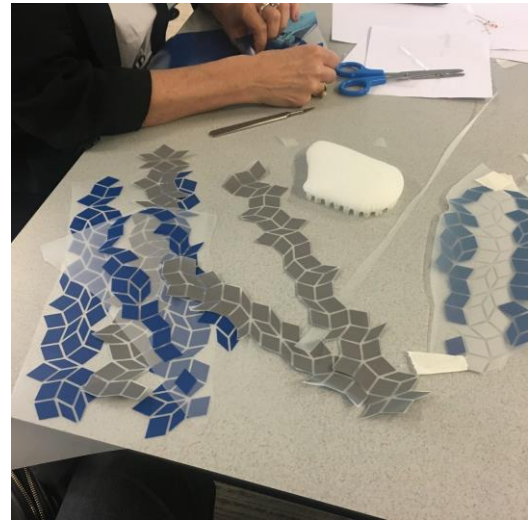
We then rapidly began to conceptualize an artefact able to communicate within the subtle nuances of the scenario conditions, recognizing that this artefact would have applications within both near future (earth bound) and distant future environments.

#### *Designing the artefact:*

Having determined that this close to the body artefact would have a primary function to augment the body's capacity to communicate velocity, position, proximity, distance, direction, and intention, and be able to (speculatively) respond to muscle movement, we made two key decisions in the shaping of the prototype. Keeping the available materials in mind, we started designing the artefact. The first was that this would be a close contact, "second skin" garment. The second was that the primary coding/communication system would be prototyped as a carefully placed graphic system, designed in response to the form of the body, and made from multiple kinds of light reactive materials. Light sensitivity was identified as a key visual code, linked to both internal neurological stimuli and to external visual communication. With these decisions agreed the process of materialization could then proceed. Starting with material swatches, a series of visual tests were run. Selections of iridescent and light sensitive film were chosen for their color changing and reflective properties. Selections of possible textiles were swatched for their second skin qualities. Combinations of these were then tested under a range of different light conditions and the performance observed and documented.



The semi rigid nature of the vinyl products spoke to a sharp edged pattern structure that would have (in scenario context) the capacity to produce a coded display visible from different directions. With an initial focus on the back, arms and upper legs a display system was then designed and printed. A near, yet not entirely symmetrical penrose tiling algorithm was selected. The penrose algorithm was selected so that the overall symmetry of the embodied graphic treatment would dominate while a subtle indication of left and right would also be present. This becomes even more apparent in live viewing as the purple/green shift of the iridescent material becomes even more apparent. A prototype skin suit garment was then designed and cut. Before final construction, the reflective film display system elements were placed and heat fused.



The research artefact poses questions as to how the surface of the body might be augmented in ways that have a specifically coded communicative function. This communication facilitates ease of mobility in populated zones and at that same time is aesthetically considered with potential for infinite variation. This is situated within a future in which everyday movement in urban contexts will become increasingly congested and require new strategies to communicate non-verbally to allow for a flow of movement. The zero gravity scenario takes this beyond the constraints of gravity on earth, and while projected into the distant future has near future relevancies and applications including dense cycling environments in which augmented garment systems could enable direct and clear modes of kinetic communication.

This digitally augmented second skin, has the potential capacity to visually and potentially aurally communicate muscle movement and intention position, proximity, distance, direction). The selection of available materials played a key role in the process of making the artefact prototype. It resulted from a negotiation between available materials and emerging concept. Ideas such as left/right orientation arrived from the material swatching.

The future aspect of the process allowed us to take a speculative step forward in what materials are capable, where they will be applied and how we might live in the future. The Everyday gave us a context that allowed speculation on how interaction can change and what needs of the individual/group evolve. Illustrations from T.A. Heppenheimer's "Benal Sphere" helped us imagine the context of the future everyday.



T.A. Heppenheimer's "[Benal Sphere](#)" (Painting by Rick Guidice courtesy of NASA Ames Research Center)

Questions around aging reconceptualized our idea as we speculated that the zero g° environment would be beneficial in limiting the effects of gravity on the body. This informed our fabrication decisions as we designed for a larger user group (all too often in fashion design the focus is on age groups from 20 to 40 years).

Discussions of choreography in zero g° environments dominated our discussions during the process. This started with the workshop on body movement the start of the workshop. Ideas of movement interactions fascinated our design process. Questions during the making process informed the ongoing design development. These questions included; What if I am traveling one direction, and you are traveling a different one, but we are going to collide? How do we grab ahold, spin around and relaunch off each other so we both go where we were headed? In turn, as we sampled, created, and placed the materials on the body, new ideas emerged. Particular attention was paid to keeping the mannequin in an orientation that kept us "off our feet". Further questions that emerged included: Where is it appropriate to make physical contact in these situations? How does the body skin garment react to that? How can we indicate that? The making process was a driver for conversation and vice versa.



The research artefact that resulted from this process is one suggestion of a possibility. It draws together the concept of the functional garment (in which a practical mode of communication or safety is a primary driver of form) with traditions of symbolically ornamented skin. Together these elements suggest how the symbolic coding of fashion might conjointly operate as coding that enhances the practicalities of physical mobility in specific time, space and gravity conditions; one of these conditions being our experience here on earth.

The making and assemblage of all elements of the garment raised many questions about the complexity of any system that might result from this scenario. The complexity of developing a system of new codes and conventions for communicating the intentions and desired interactions for movement in zero g environments is intricate. In this instance, the prototype could only begin to model a concept, while opening up a vast array of practical and technical questions. Importantly it raises new questions about the purpose of clothes and garments, when de-coupled from notions of fashion and identity and repositioned within a system of needs based communication.

By beginning with the making process framed within narratives and scenarios - the research artefact that emerges provokes the next set of questions. The artefact locates the speculative nature of the narrative or scenario that supports it within the domain of the makeable and it is in this tactile and tangible form that asks -- what if? In this way, the process inverts the more conventional sequence whereby the questions are asked first and then the artefact is designed in response to those questions.

The Future Everyday is an immensely useful framing structure in that it offers a bridge between the familiarity of current daily practices and speculative future iterations of them. The research artefact is a material, conceptual and theoretical response. As artefact it gives material form to a narrative/scenario and this context gives rise to its meaning and the questions it poses. In the context of the future everyday "What if" questions can be positioned in terms of the near or distant futures. What we discovered by positioning our "what if?" questions in distant future scenarios is that they opened up radical shifts in terms of reference. As an outcome we find new ways of thinking that also had applicability when considered in terms of near future contexts (for example applicability of sensing garments as signage systems in congested urban contexts both for pedestrians, motorcyclists and cyclists). Thus, distant future speculation opened up strategies for near future solutions.



This experience of working with rapid ideation and research through making was facilitated by a team with complementary interests and expertise. Trust in the team partnership was facilitated by the opening workshop in which dance and design pedagogies were drawn together to build a productive working relationship between team members. The process necessitated a willingness to embrace the speed of decision making, commit to fast non-distracted making, and to draw on the energy of team generated ideation. As the artefact developed the team engaged in an ongoing exploration of accompanying narrative and at the same time progressive ownership of the concept. This supported the momentum and purpose of making, the imperative to deliver at the end of the process, the rationale for the concept and artefact and its final exhibition.