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# Play Poles

## Towards IoT Resources for Outdoor Play

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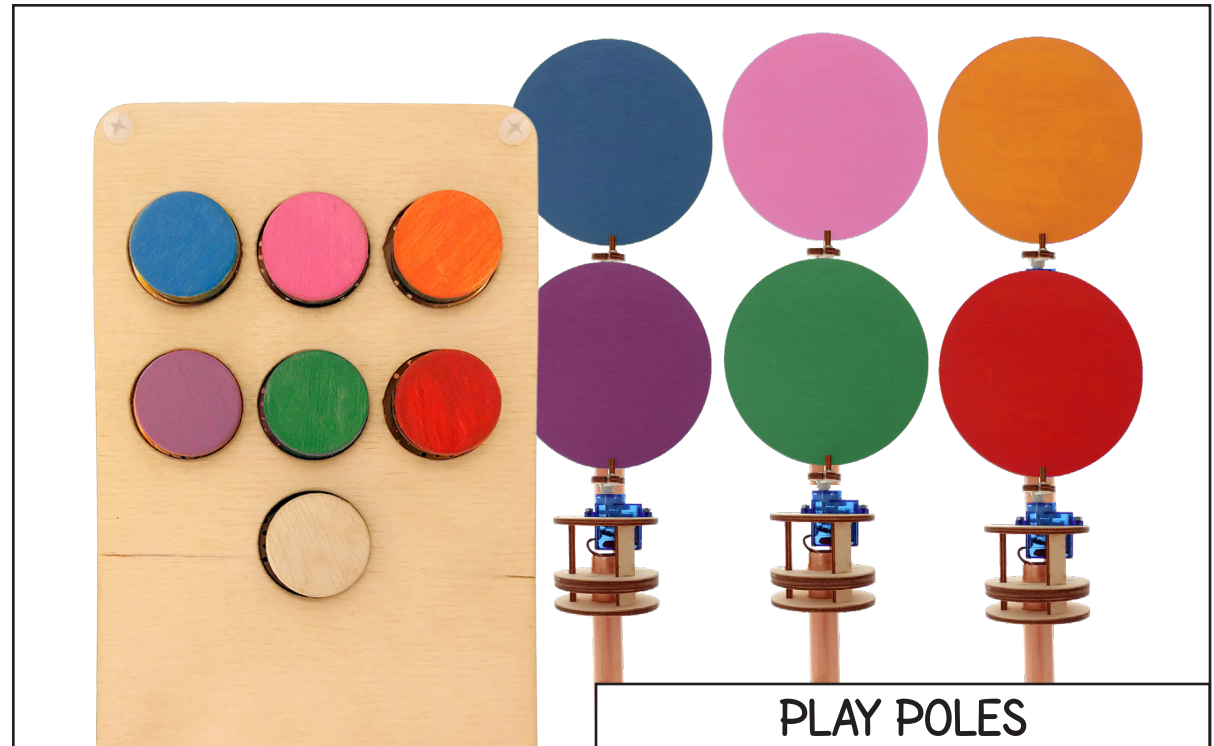
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### ABSTRACT

This pictorial reports on the Play Poles prototype that was designed as part of a design ethnography investigating the Internet of Things (IoT) as a resource supporting outdoor play amongst groups of children. We use illustrations and annotations derived from video data and analysis to depict gestures, actions and social interaction that are significant in understanding the qualities of the Poles as a play resource. We argue that simple functions and direct, real-time control can be used by groups of children to support fun and creativity in outdoor play, whilst also highlighting opportunities and challenges in designing IoT play resources.

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### AUTHOR KEYWORDS

Children; Play; Field Study; IoT

### CSS CONCEPTS

• Human-centered computing~User centered design

## INTRODUCTION

This pictorial presents insights from an ongoing design ethnography looking at the creation of IoT (Internet of Things) resources that can support children's outdoor play. The research and design respond to the important societal concern that children are playing outside less and less. Rather than programming interactions and then playing, we present a simple way of giving children direct, real-time control of interactions, through a controller. We contribute to a growing body of work in HCI looking at pervasive technologies for children's outdoor play [1,2,3,4,5,6]. We present analytic themes generated from this study that are of interest to the DIS community.



**Community centre yard with Play Lab activity centre on the left**

Our ethnographic work has been with a local community centre and has taken place over a 13-month period. Throughout this enquiry we have learnt about and responded to a culture of play at the community centre that is supported by two experienced play leaders whose voices are salient throughout this pictorial account. Over the period of engagement, we have spent time helping with activities, held workshops focused on learning about the children's outdoor play and introduced off-the-shelf programmable IoT devices [7].

We use our Play Poles prototype to visually unpack qualities and insights that are important when designing for outdoor play with IoT. Though the children have played games, we have not been designing games, but rather interactive resources that can support and extend existing outdoor play amongst groups of children. Our Play Poles provide a working example of how IoT can sit alongside a plethora of existing resources that children could adopt within play.

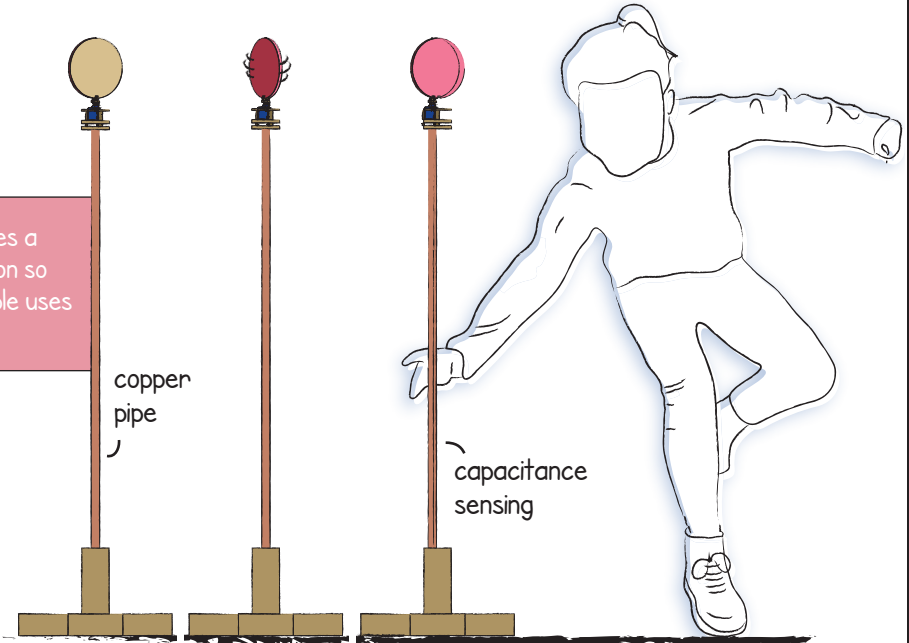
Throughout we convey the richness of children's social interaction with the Play Poles, offering multiple levels of information and interpretation alongside annotations that direct the reader. Video footage has enabled us to consider in more detail the children's interaction with the Play Poles and each other. These same videos have been jointly analysed with play leaders who were asked to talk about video clips. Their individual responses have been added as a commentary to support our illustrations and provide extra insight. The pictorial format has enabled us to compose a paper that leverages visual argumentation, which supports the practice-based and observational nature of our research. In order to preserve the anonymity of the children, we have traced over the video stills, which has ensured the anonymity of the children, while retaining key gestures and incidents that support our visual analysis.

The Play Poles provide children and play leaders with simple play functions that can be controlled and used imaginatively in a direct, live and responsive way. In this pictorial we draw out important features of play and facilitation, as well as the role of the Play Poles controller. In so doing we also point to important qualities and dynamics of IoT in play, from the situated perspective of our design ethnography.

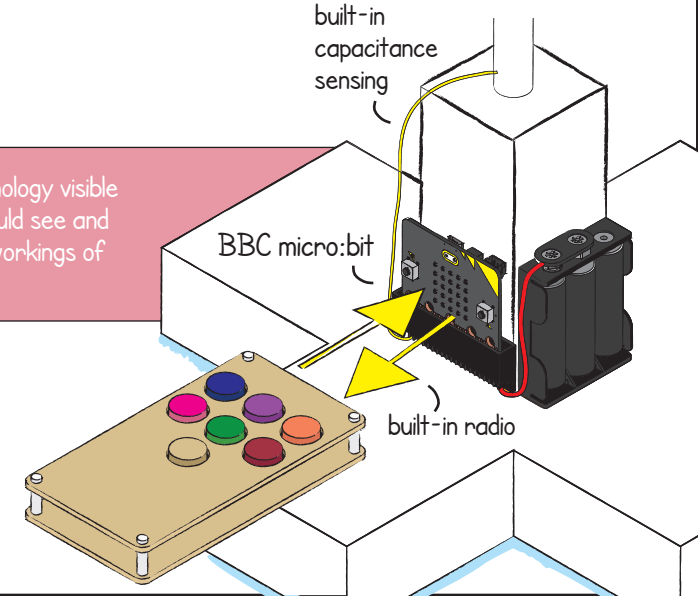
# DESIGN DECISIONS

We purposefully designed the Play Poles to have clear, simple functionality, as a transparent assemblage of component parts. The 'flipping' behaviour of the rotating discs was triggered by two events: button-pressing on a remote control; and touching the copper pipe. The children and facilitators at the community centre quickly understood this mechanism and the cause and effect of their interactions. This enabled the children to swiftly devise creative things to do with the Play Poles, such as inventing and adapting outdoor games to play together.

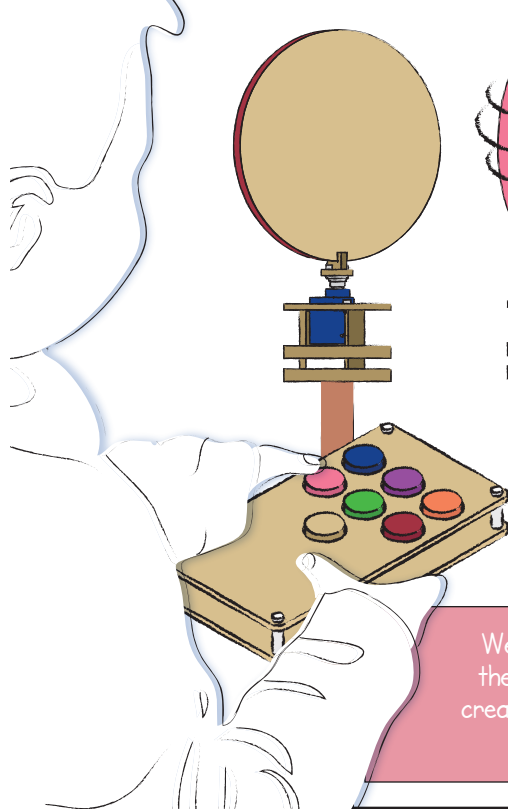
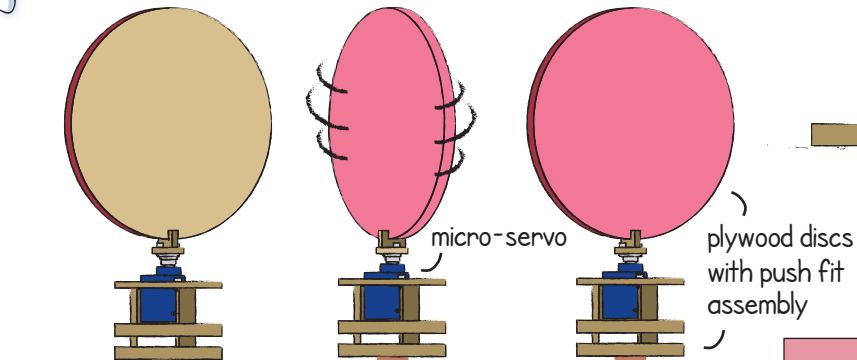
We gave the Play Poles a clear and simple function so they are open to multiple uses and interpretations.



We left the technology visible so the children could see and engage with the workings of the Play Poles.



We devised a simple controller so the children and facilitators could create interactions in the moment, simply by pushing buttons.



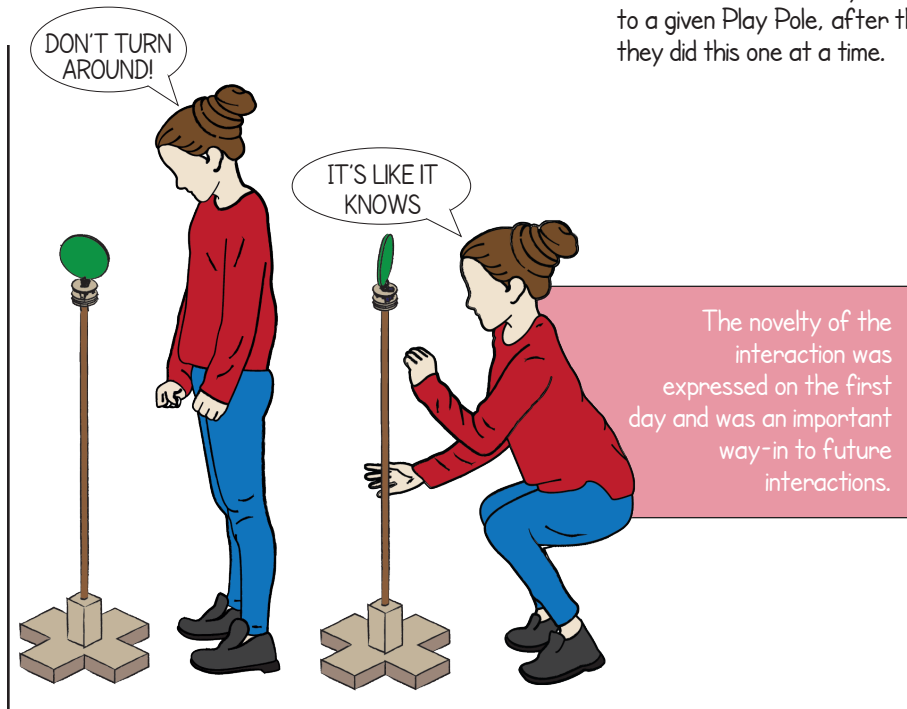
## FIELD ENGAGEMENT

We spent a week during half-term (10-3pm) at the community centre with children aged between 6 and 10 years old. We introduced the children to the Play Poles on the first day when they were playing out, and on the following days just left the Poles around indoors to let them play as they saw fit. Throughout the week two professional facilitators were present and we draw on their wealth of experience in this pictorial. We have pseudonymised these facilitators as Dave and Jessy.

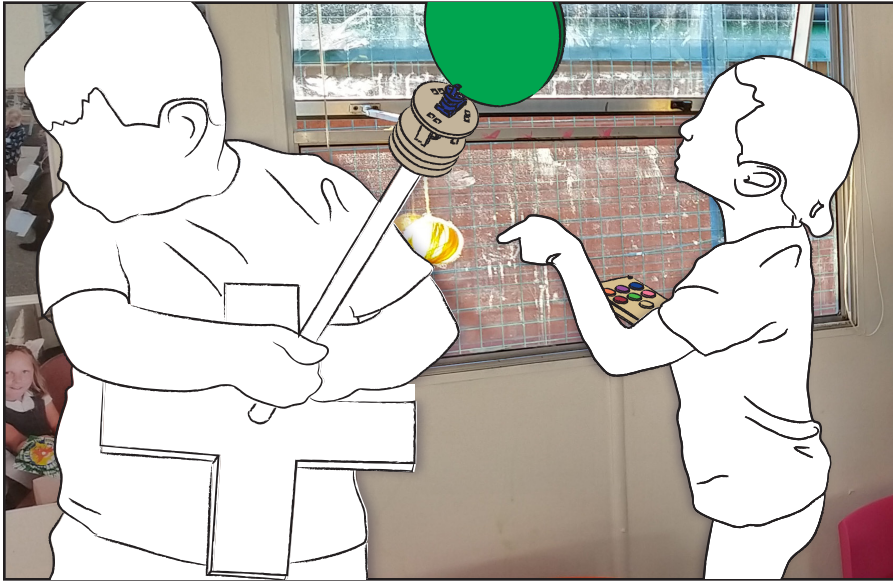


We introduced the Play Poles by inviting the children to run to a given Play Pole, after they saw it flip. To start with, they did this one at a time.

It wasn't long before the children realised they could push more than one button at a time.



This led the children to enthusiastically run around together, laughing and shouting as they tried to "catch all the targets".



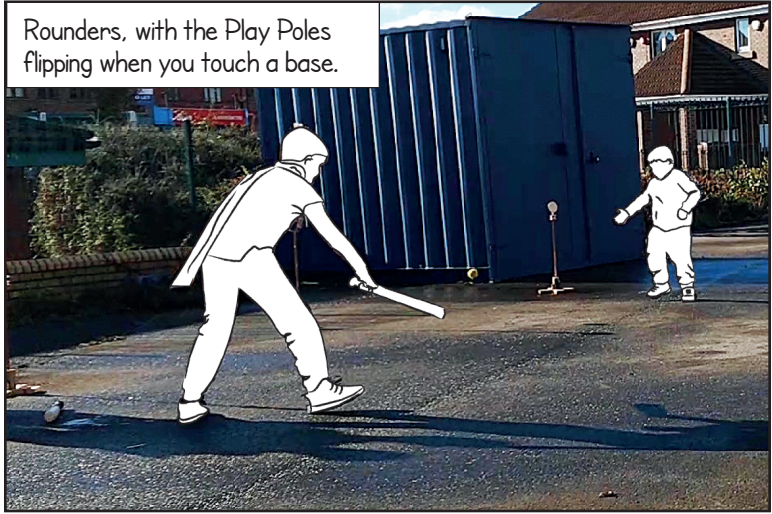
On the following days we left the Play Poles around indoors for the kids' ad hoc use.



Later in the week we found the kids began to take a sense of ownership and responsibility for the Play Poles and their play with them.



A game of tag with the Play Poles as temporary safe zones.



Rounders, with the Play Poles flipping when you touch a base.

Whilst we observed a lot of unstructured running around with the Play Poles, at times supported by use of the controller, the Play Poles also became an inherent part of various games.

**REFLECTIVE CO-ANALYSIS**

Following our field engagement, we analysed the video to draw out significant clips. These clips were then shown to Dave and Jessy who were present during the week. Dave and Jessy were asked to talk about 'what they see happening in the clip'. Together, we have generated themes important for the development of IoT resources.

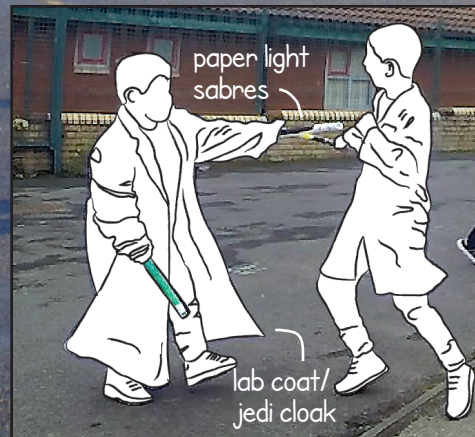
**Resultant key themes are captured on the pages to follow.**

# REFLECTIVE CO-ANALYSIS

## ADAPTABILITY

The Play Lab children have always been responsive to what is around them, bringing different materials and artefacts together to suit how they want to play, at any given moment.

Like other resources, IoT needs to be available, to be folded into play at a whim, both physically and functionally.

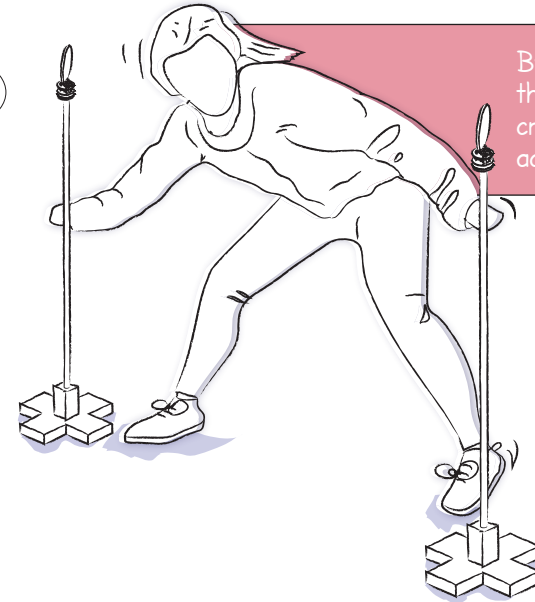


## ADAPTABILITY

"If you give them something simple or small they'll just adapt it to whatever they want to make it. That's the beauty of this. It's so adaptable, if something doesn't work or they don't like it, fine we will move on to something else".

- Dave

The controller became a popular role in rule-based games, so much so, that at times we had to facilitate turn taking.



By pressing buttons, the children could create unstructured, active play.

The immediacy of the interaction enables play to be made in the moment.





## TAKING CONTROL

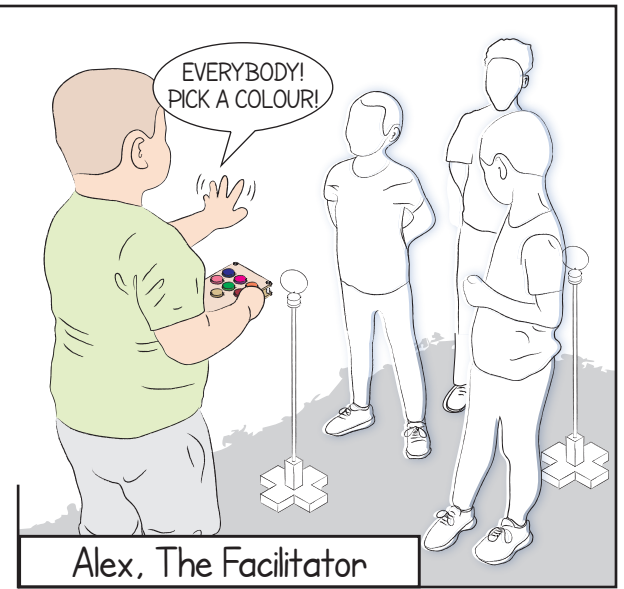
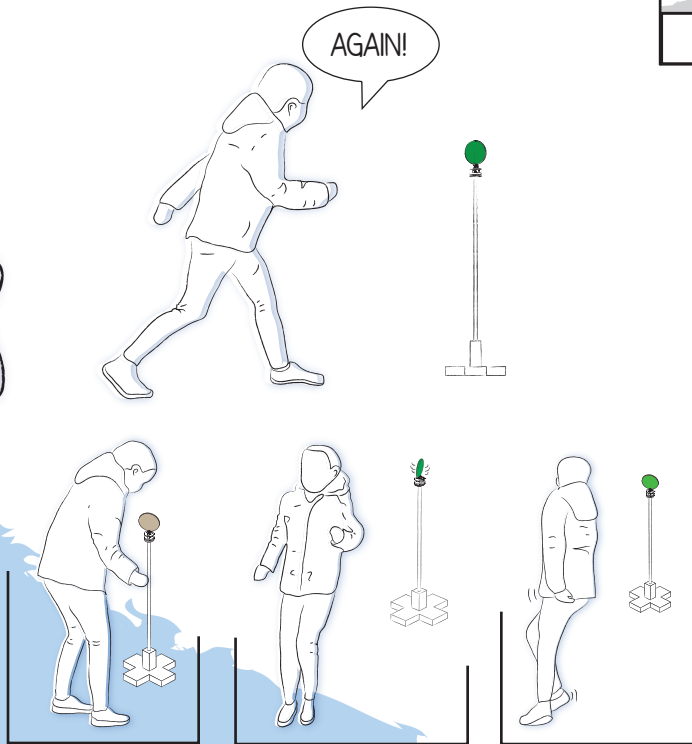
Having the controller allowed the children to take different roles in play, depending on their interests and abilities, as a way of enabling them to participate on their own terms. This highlights a need to support individuals, as well as the challenges of facilitating inclusivity in group play outdoors.



Max, The Joker

"Alex doesn't like losing. And then you've never seen him happier in this clip when he had the controller: Absolutely loving it."  
- Dave

"Because he was in control. He can interact more with it, so he is interacting more than he is participating, he is participating but knows he is not going to lose."  
- Jessy



Alex, The Facilitator

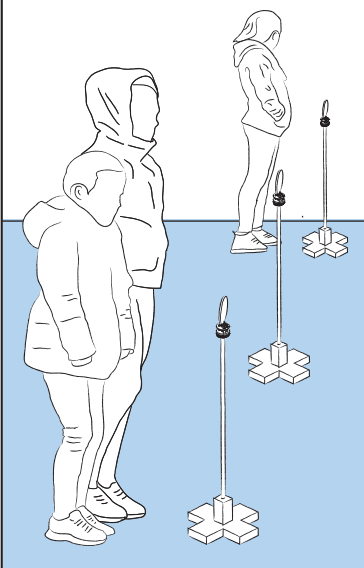
"It was good to see Max stand still. It's something that he can focus on and concentrate on. His concentration span is shocking and it's nice to see him stand still and do something. You don't get Max to interact with others a lot because his concentration just goes."  
- Jessy

"And his laugh as well. He was really enjoying himself and happy doing that. Which I find quite amazing because Max is a difficult person sometimes. Very difficult person and so it was good to see him interacting like that."  
- Dave

## FAIRNESS

### HOW TO PLAY THE COLOUR GAME

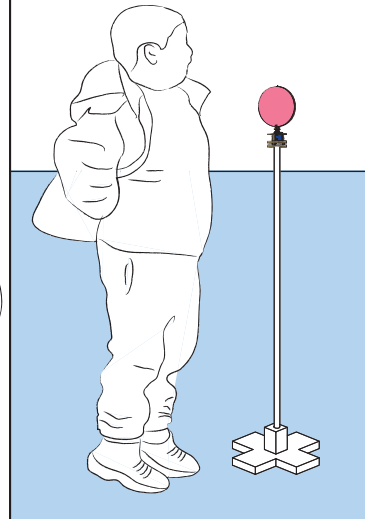
Stand beside a Pole.



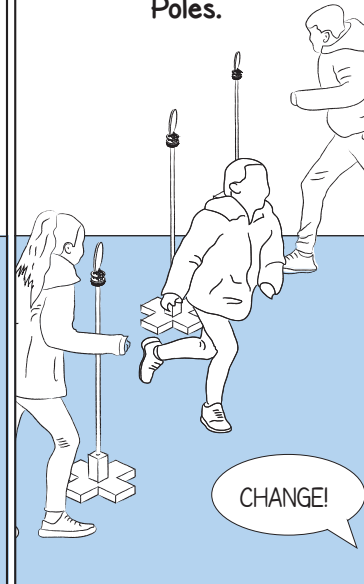
The person with the controller pushes a button without looking (though they can listen).



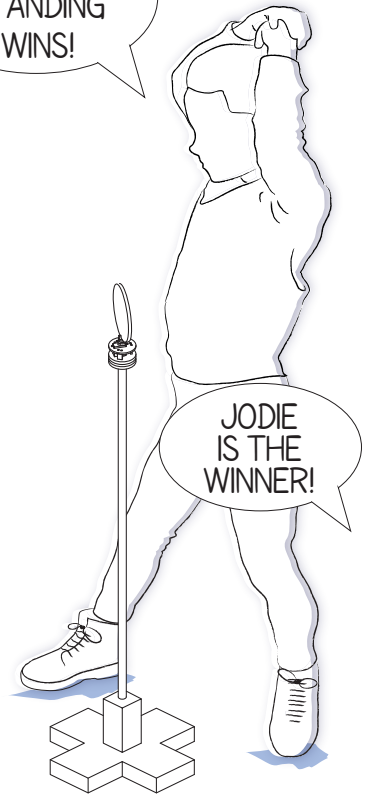
If your pole spins, you are out until the next game.



You can then change Poles.



LAST MAN STANDING WINS!

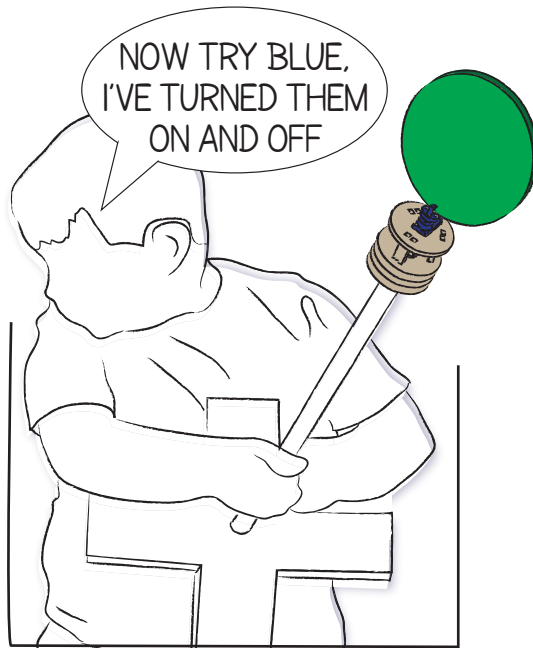


The colour game was the children's favourite. Where some games caused fall outs, in the colour game no one was directly responsible for putting you out so no one was better or worse. It was all down to a random button press. For Dave and Jessy, creating games is great, but they need to be fair for everybody.

"To play the Colour Game with the kids has been better than them doing Octadog because the arguments the kids have had playing that Octadog, where that is just absolutely brilliant because we've all been involved with it, if they've been out they've been out and there has not been any arguments."  
- Jessy

"We are good at doing games or activities where you limit that possibility. It is taking them away from feeling like they might be excluded, or are not good enough, or to make them feel good about themselves. Whereas that one there (Colour Game). It's pot luck. There's no way you can predict it."  
- Dave

## RESPONSIBILITY AND OWNERSHIP



"They want to understand it a bit better and learn more about it. They will hopefully take that ownership on when they take it outside." - Dave



WHAT ABOUT  
THIS ONE AT THE  
BOTTOM?

While inside, one of the children wanted to show the Play Poles to a friend. Once shown how to plug in the batteries, the kids were keen to figure out how everything works for themselves.



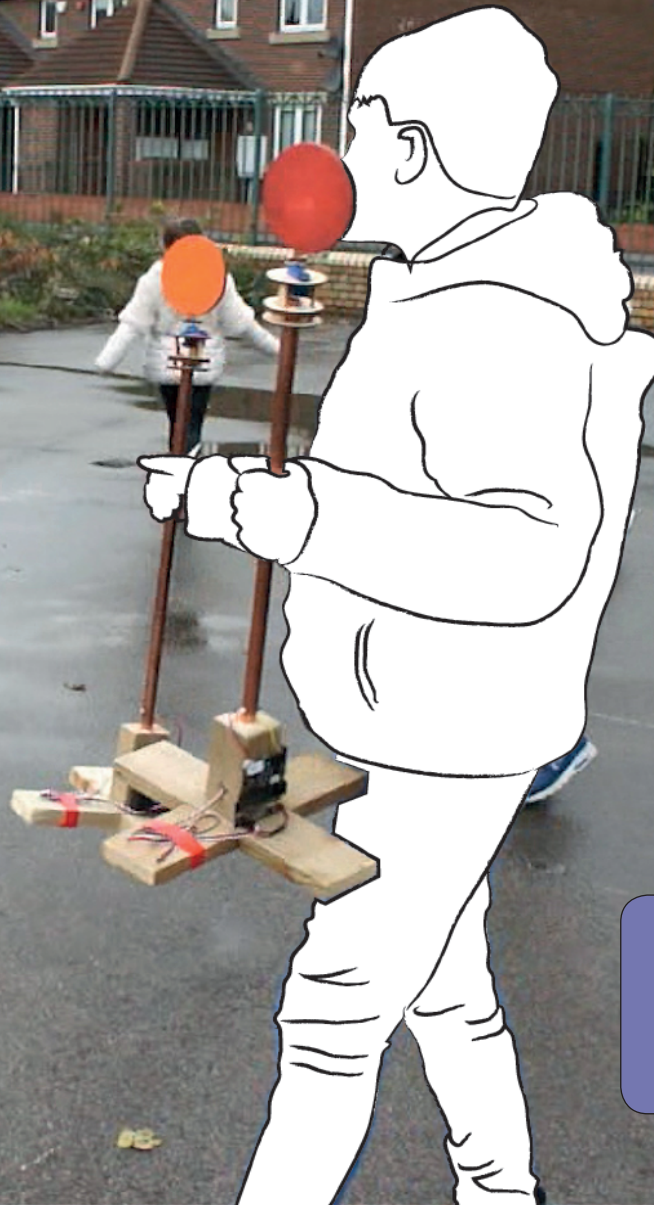
"And then when it wasn't working they wanted to know why it wasn't working, to figure it out." - Jessy

## RESPONSIBILITY AND OWNERSHIP

"It's like, this is our game now, that's quite interesting. They've created that game. So, we're going to play because we know how to do it, nice to see." - Dave



"That ownerships already well established there, they were taking them off to put them in place. You can see they are going, getting excited about it, making sure it was all set up properly." - Jessy



"They want to be involved in doing something and being trusted to do that." - Jessy

"They don't want it broken and would rather fix it. So Max actually identified a problem and thought right. I need to tell someone about this."

- Dave

## DISCUSSION

By drawing over and composing action from our video analysis we have aimed to support our design ethnography by visually contextualising how the Play Poles were used. We have found that illustrating the children's gestures has provided inspiration and understanding about how to design for outdoor play, alongside our analysis of field note descriptions and the embodied experience of being there. We have deepened our analysis by using the video footage captured in the field as a medium for critical co-reflection. We viewed it with the facilitators to support a co-analysis of the fieldwork, and in turn gained greater insight on the design space from their professional experience. This method therefore led us to understand more fully the role of the Play Poles as a research prototype. In this visual paper, we offer up transferable methodological insight by showing our process of using the video as a medium for reflection and illustrating how it informed our ongoing design ethnography.

We have also presented key themes that we found to be important in the development of IoT as a tool-kit resource for outdoor play. We present DIRECT CONTROL as a simple functional feature which enabled the children and facilitators to create play interactions by pressing buttons on demand, and which can become a role in rule-based games the children already enjoy. We show that DIRECT CONTROL can enable some children to take leading roles that support them as individuals in outdoor play (Alex and Max). While a number of design studies have looked at game dynamics and affordances for outdoor play, we suggest that the ethnographic approach has allowed us to focus on the realities of outdoor play, and to understand the individual challenges inherent in outdoor play.

The Play Poles were found to be valued as an 'open resource' that afforded creative interpretation in use. However, we came to understand the importance of facilitation in the open play context for providing boundaries and limitations to this use. Such facilitation could mean incentivising going outside, managing turn-taking when using the remote control, or scaffolding a sense of shared ownership or responsibility for the Play Poles.

We also gained insight about how this facilitation was supported by the Play Poles. In creating IoT resources for outdoor play, the Play Poles make up a network of connected artefacts that are highly configurable in physical space, accommodating individual and group engagement. As captured in this pictorial, we found the children could play with the Play Poles both together, and on their own. We understood the importance of enabling the children to explore and understand the technology itself – individually and collectively. The invitation to do so is made more enticing by leaving the functionality transparent, and making the core components of each Play Pole visible. The children were keen to engage with, explore, and understand the Play Poles and this invoked a sense of shared care and responsibility and was found to encourage the children to share and play together. In looking forwards to designing an IoT tool-kit for outdoor play, we see the value of enabling the children to engage with the technology, but show that the mere construction and visibility of technology can be enough to prompt a desire for greater understanding.

Finally, we argue it is important to acknowledge and understand the role of organisations like community centres in enabling the children to understand and develop responsibility together, providing a degree of facilitation that the children can take on. Like the Play Poles, play leaders are important resources when looking to support outdoor play and so it is essential to understand their role and relationship to the introduction and continued use of IoT resources.

## ACKNOWLEDGEMENTS

We wish to thank the children and play facilitators at the Play Lab, who have informed and inspired our research and design work.

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