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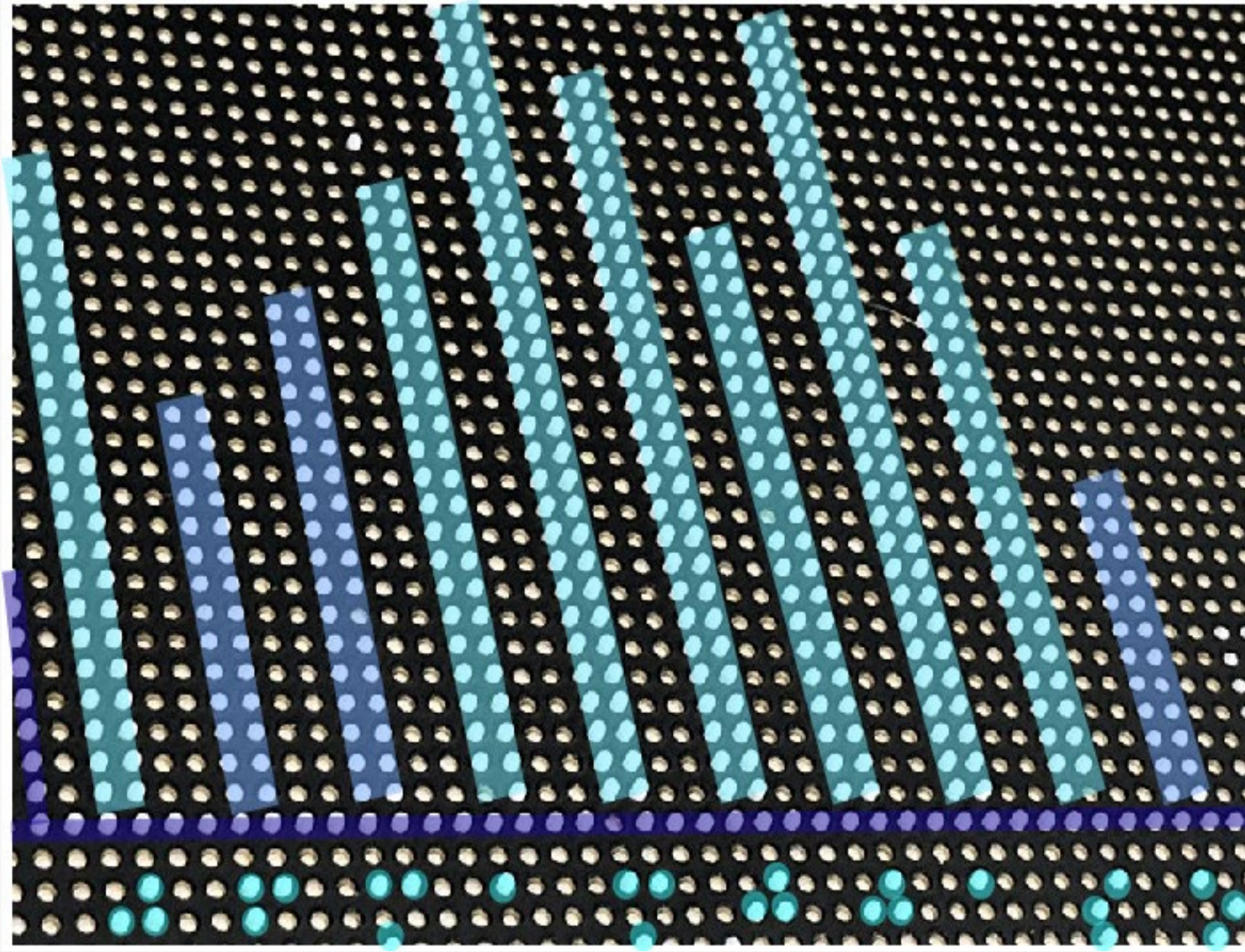


Figure 1: Bar graph with multiple pin heights on a Graphiti refreshable tactile display

Abstract

Refreshable tactile displays are predicted to soon become a viable option for the provision of accessible graphics for people who are blind or have low vision. This new technology for the tactile display of braille and graphics, usually using raised pins, makes it easier to generate and access a large number of graphics. However, it differs from existing tactile graphics in terms of scale, height and fidelity. Here, we share the perspectives of four key stakeholders to explore the potential uses, advantages and needs relating to the introduction of refreshable tactile displays. We also provide advice on what role the data visualisation community can take to help ensure that people who are blind or have low vision are best able to benefit from the introduction of affordable refreshable tactile displays.

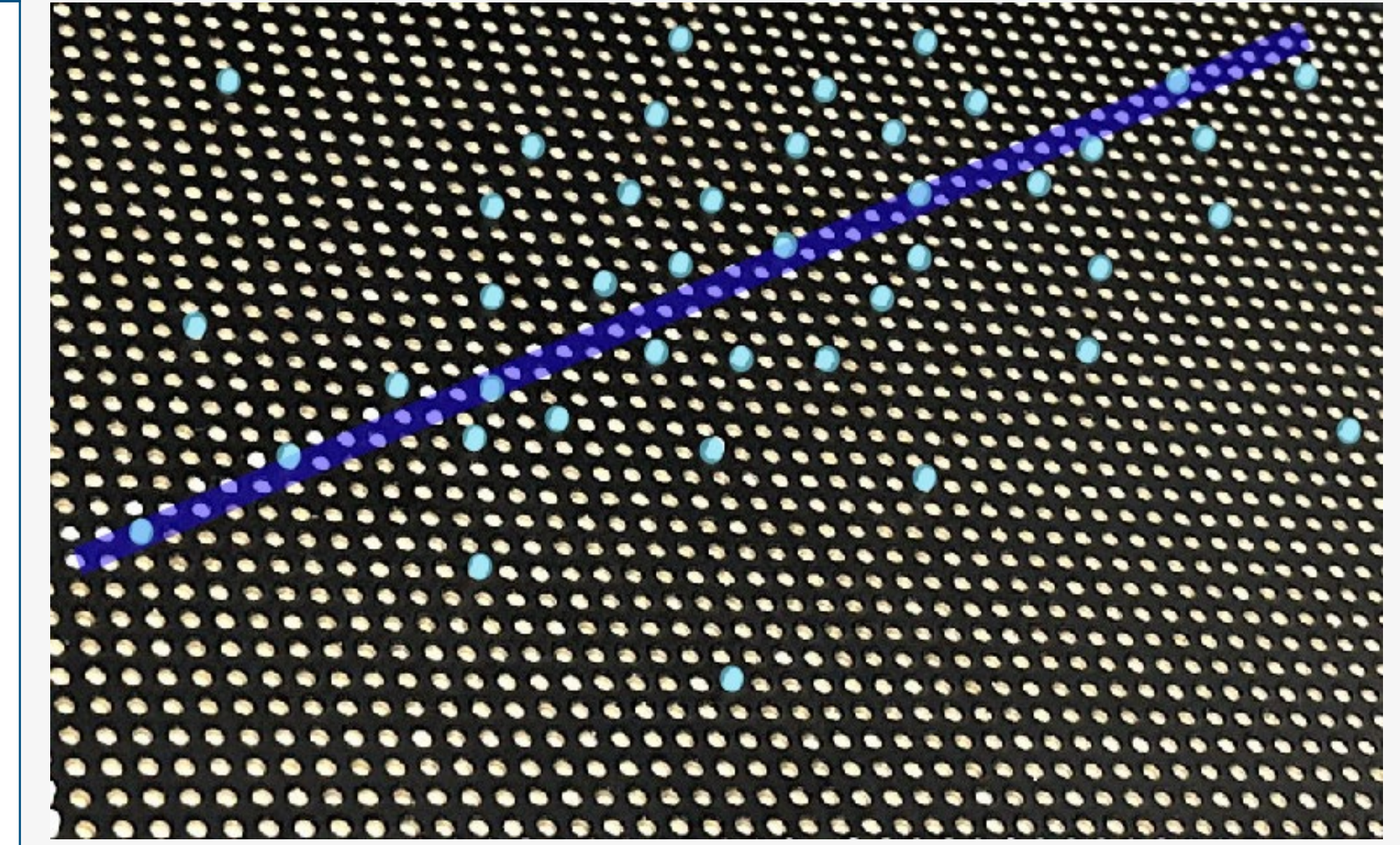


Figure 2: Scatter plot with line of best fit on a Graphiti refreshable tactile display

We are excited about ...

Blind Touch Reader

- Dynamic content
- Timeliness
- User creation

Vision Specialist Teacher

- Timeliness
- Use in schools

Accessible Format Producer

- Immediate feedback & correction
- User creation

Assistive Tech Provider

- User creation
- Dynamic content
- Use in schools and the office

Stakeholder Perspectives

Stakeholders are excited about refreshable tactile displays offering a fundamentally new kind of tactile graphic experience.

Dynamic content: Animations to show change and movement [1] and real-time data feedback.

Timeliness: Tactile diagrams can be created quickly, displayed immediately, and easily adjusted in response to user feedback or to add more detail once the initial concepts are understood.

User creation: People who are blind or have low vision want to easily create their own visualisations from equations, data, drawing with the finger, or importing existing diagrams [2,3].

Use in schools and the workplace: As refreshable tactile displays are expensive and heavy they are most likely to be adopted for use in schools and the workplace where they can be used often and in a fixed location.

Try it Yourself!

Can you create a meaningful data visualisation using a grid of raised dots?



Figure 3 (left): Line graph depicting rainfall (dark blue) and water storage (pale blue) on a Graphiti display. Note that the colours are added for visual clarity – on the refreshable tactile display they are represented through pin height.

Figure 4 (above): Sample tactile graphic produced with a braille embosser.

Figure 5 (right): Weather heatmap for Australia on a Graphiti refreshable tactile display.

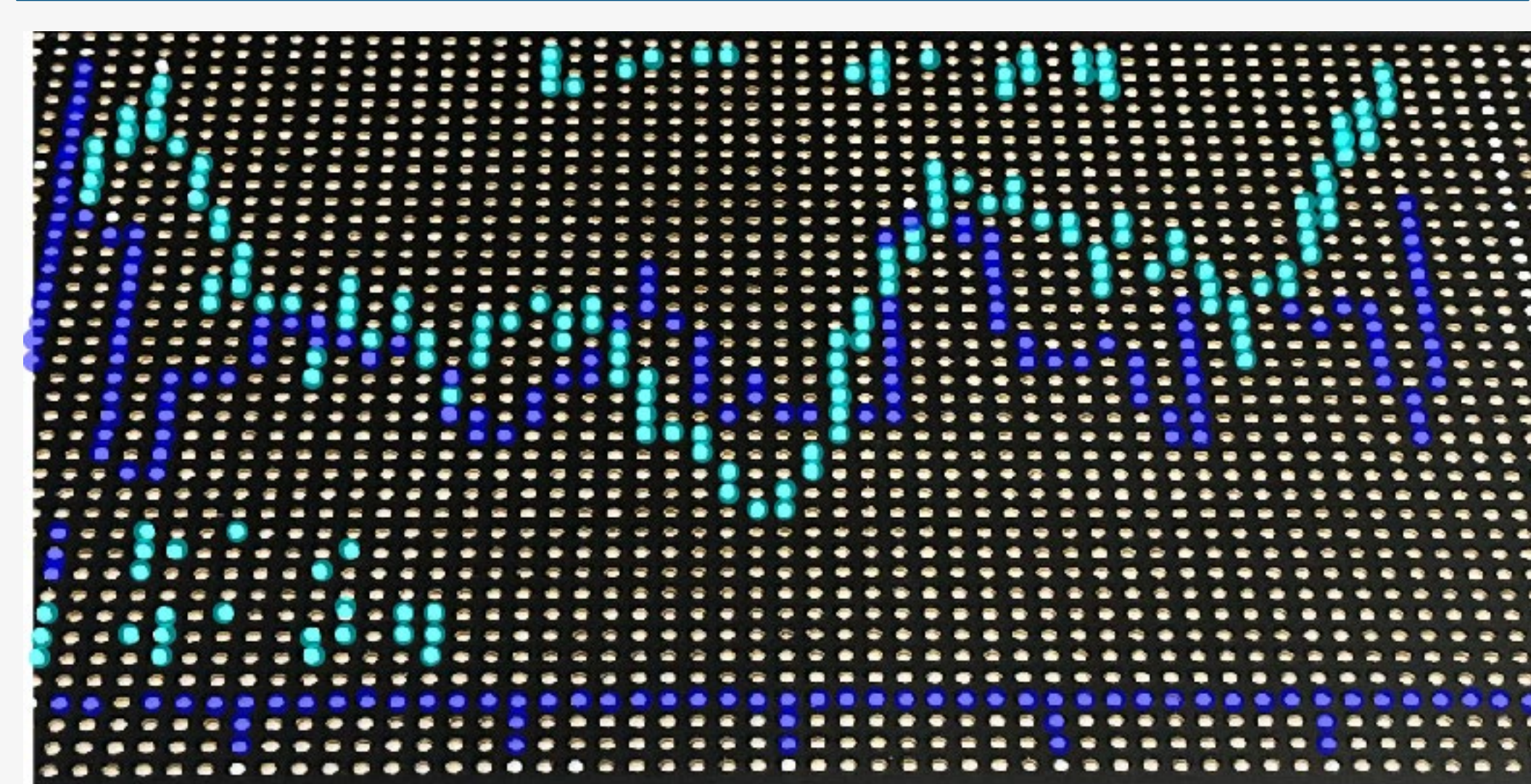
Key Challenges

The effective introduction of refreshable tactile displays must be informed by learnings from data visualization, design guidelines for static tactile graphics, and co-design with people with lived experience of blindness.

Best-practice tactile visualisation: User testing is required to determine best-practice guidelines for the design of tactile visualisations using a limited grid of dots or pins.

Interactions: Investigate effective interaction methods for zooming and panning [4,5] and combining refreshable tactile displays with speech and sonification.

Content creation: Accessible software and conversion processes are needed so that people who are blind or have low vision can create their own data visualisations.



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