The Grid

Interactive Field Emission Display

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Summary

An art/engineering installation consisting a grid of poles illuminated by white LED strips. Interactivity is provided through a computer vision system utilising a night vision camera. Applications include a virtual maze and interactive display patterns. Primary requirements are a 14m × 18m area of unlit ground and access to mains power (approx 1.5kW peak).

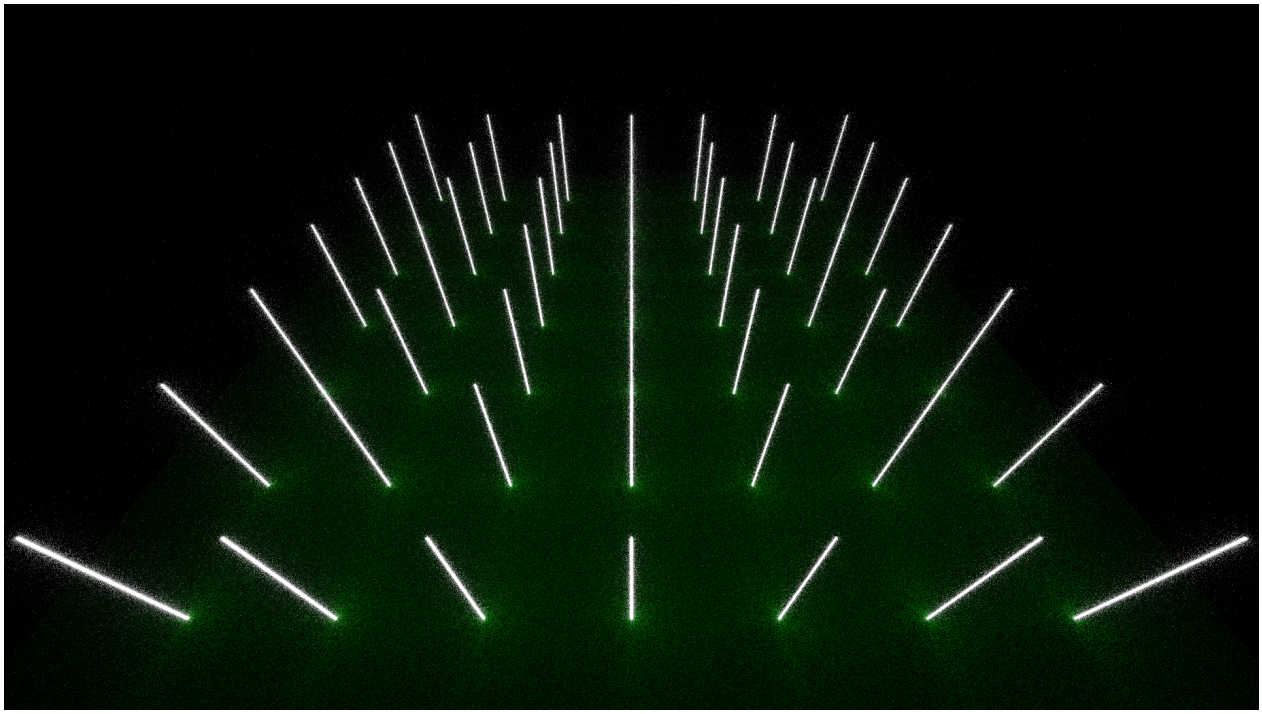

Figure 1: A computer graphics simulation of The Grid.

1 Design

1.1 Layout

The Grid would occupy a space of approximately 18m × 14m. Of this, 12m × 12m is the grid itself, consisting of a 7 × 7 grid of poles with 2m spacing. A backstage area holds the power and control tent as well as the camera mast.

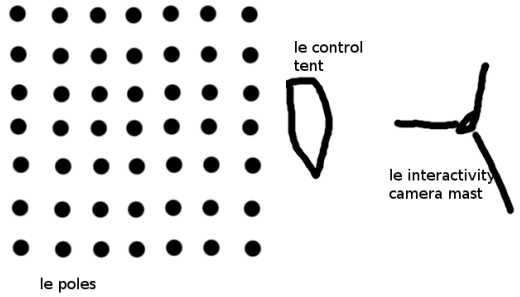

Figure 2: Plan schematic

1.2 Structural

Each pole will protrude 2.5m from the ground. The total length is 3m, with 50cm being inserted into the ground. The poles are constructed from $\frac{3}{4}$" × $\frac{3}{4}$" × $\frac{1}{16}$" aluminium angle section. See Appendix A for detailed drawings.

The interactivity camera will be mounted 8m above the ground on a 10m fishing pole, guyed for rigidity.

1.3 Electrical and Electronics

1.3.1 Cabling

Each LED strip will consume around 2A when active. The wiring for one strip will consist of twin core cable carrying power and return between the strip and the control tent. Additionally, a coaxial connection will run from the interactivity camera to the control tent.

All cabling inside The Grid will be buried slightly below ground to avoid a trip hazard.

1.3.2 Switching

Each LED strip will be controlled using a BD679 Darlington pair as a driver. The drivers will be switched by six 8-output shift registers, themselves controlled by the CPU.

1.3.3 Power

The maximum power consumption of The Grid will be 100A. This will be provided by four 550W ATX power supplies, each rated for 32A on the +12V rail.

1.4 Software and Control

A laptop in the control tent will generate display patterns and handle interactivity. It will transmit lighting data via a serial link to an Arduino. Upon receiving each frame, the Arduino will clock the data into the shift registers, then activate the output latch.

A Engineering Drawings

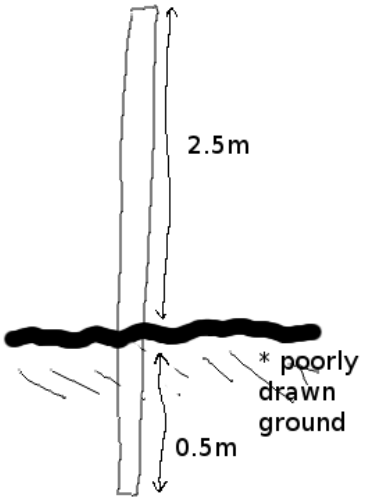

Figure 3: Side view of a single pole

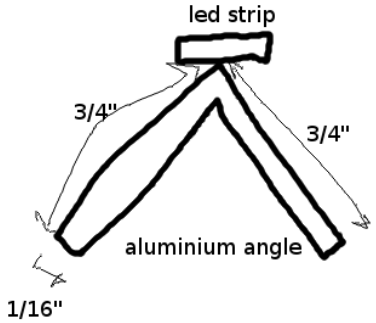

Figure 4: Top view of a single pole with LED strip