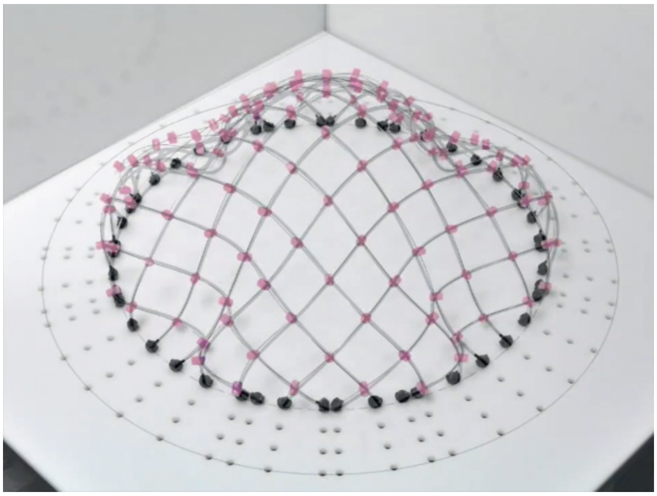
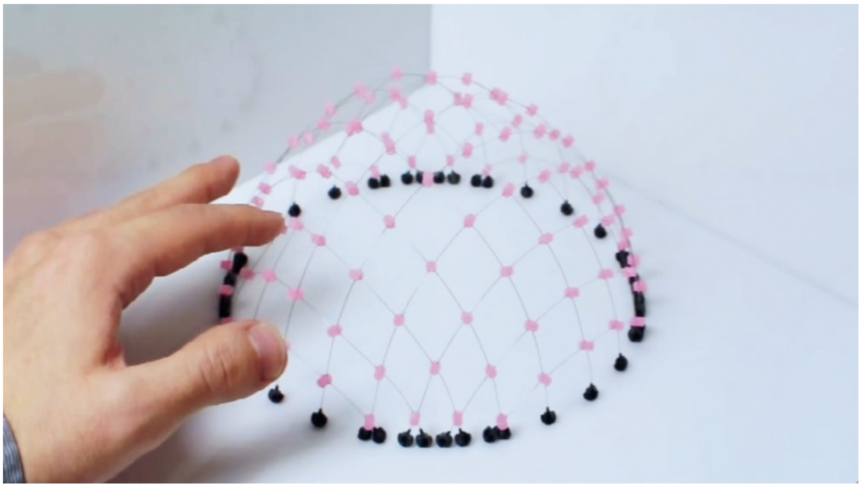
Supporting Information

Baek et al. 10.1073/pnas.1713841115



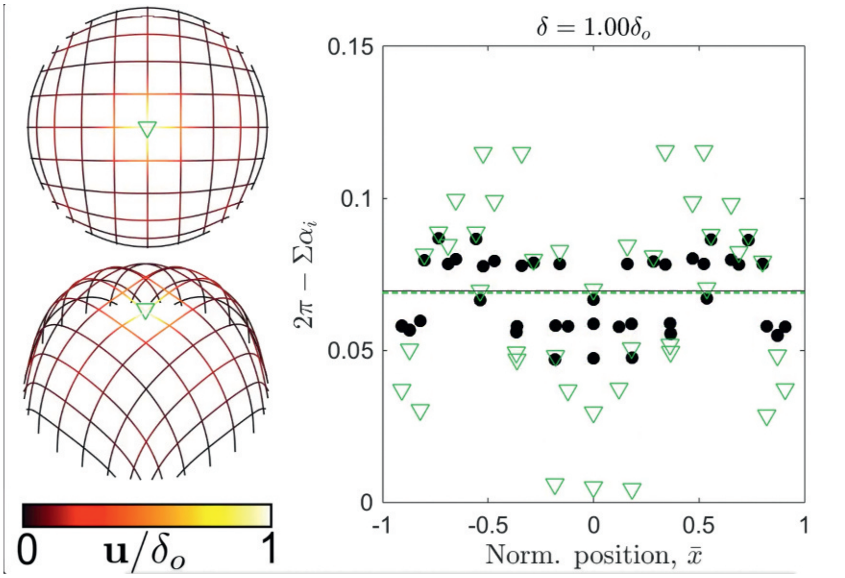
Movie S1. Elastic gridshells with circular boundaries. Shown is actuation of an elastic gridshell with original (radius $R_o = 126$ mm) and actuated boundaries (radius $94.5 \leq R_a$ [mm] ≤ 126) that are both circular. Time evolution of the simulation gridshell is overlapped with the snapshots of the physical gridshell at the following values of the compressive strain: $\epsilon = \{0, 0.08, 0.17, 0.25\}$.

Movie S1



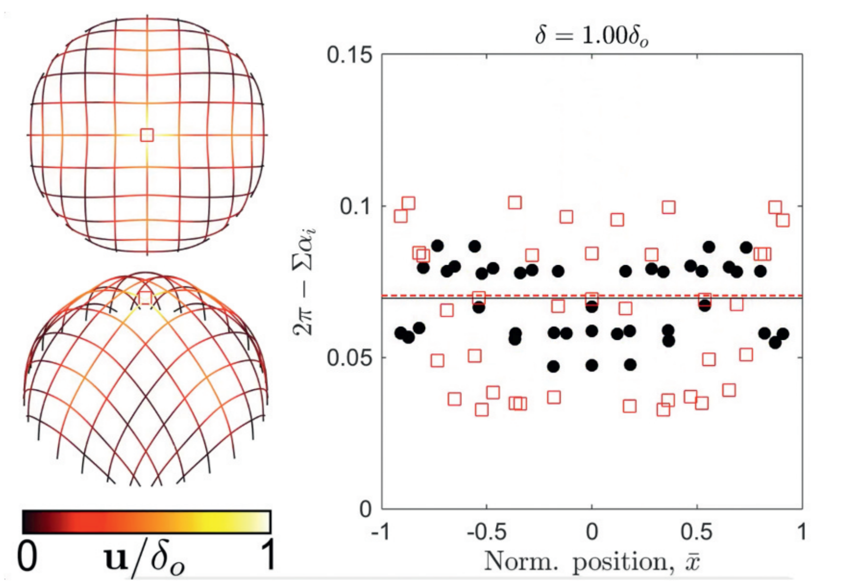
Movie S2. Elastic gridshells under manual indentation. Shown is manual indentation of the hemispherical elastic gridshell obtained from Chebyshev's hemispherical ansatz (radius $\rho = 76$ mm, number of rods per direction $n = 11$, unit cell spacing $d = 20$ mm), under (*i*) inward and (*ii*) outward normal displacement at the north pole and (*iii*) inward displacement at side points, e.g., $\pi/4$ latitude and longitude. Nonlocal response is observed for all three cases of indentation.

Movie S2



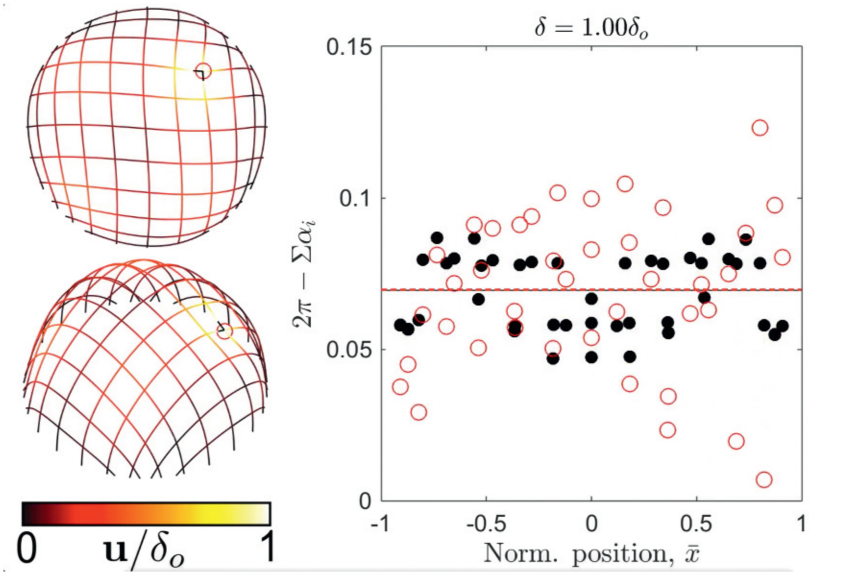
Movie S3. Inward normal indentation at the north pole. An inward normal indentation displacement of magnitude $\delta_o = 0.1\rho$ is applied at the north pole of the hemispherical elastic gridshell (same as Movie S2) and the corresponding response is observed via DER simulation. The time evolution of both the displacement field $\mathbf{u}/\delta_o$ (*Left*) and the spatial distribution of the integrated Gauss curvature $K^{\square}$ of the actuated unit cells (*Right*) shows the nonlocal response. In the plot (*Right*), the horizontal solid line (black) corresponds to the average of $K^{\square}$ for initial actuated configuration and the horizontal dashed line (green) corresponds to the average of $K^{\square}$ during indentation.

Movie S3



Movie S4. Outward normal indentation at the north pole. An outward normal indentation displacement is applied at the north pole and the corresponding response is observed via DER simulation. All of the conditions are the same as in Movie S3 except that the direction of the indentation is outward. The time evolution of both the displacement field $\mathbf{u}/\delta_o$ (*Left*) and the spatial distribution of the integrated Gauss curvature $K^{\square}$ of the actuated unit cells (*Right*) shows the nonlocal response. In the plot (*Right*) the horizontal solid line (black) corresponds to the average of $K^{\square}$ for initial actuated configuration and the horizontal dashed line (green) corresponds to the average of $K^{\square}$ under indentation.

Movie S4



Movie S5. Inward indentation at $\pi/4$ latitude and longitude. An inward indentation displacement is applied at $\pi/4$ latitude and longitude and the corresponding response is observed via DER simulation. All of the conditions are the same as in Movie S3, except that the location of the indentation is at $\pi/4$ latitude and longitude. The time evolution of both the displacement field $\mathbf{u}/\delta_o$ (*Left*) and the spatial distribution of the integrated Gauss curvature $K^{\square}$ of the actuated unit cells (*Right*) shows the nonlocal response. In the plot (*Right*), the horizontal solid line (black) corresponds to the average of $K^{\square}$ for initial actuated configuration and the horizontal dashed line (green) corresponds to the average of $K^{\square}$ under indentation.

Movie S5

Other Supporting Information Files

SI Appendix (PDF)