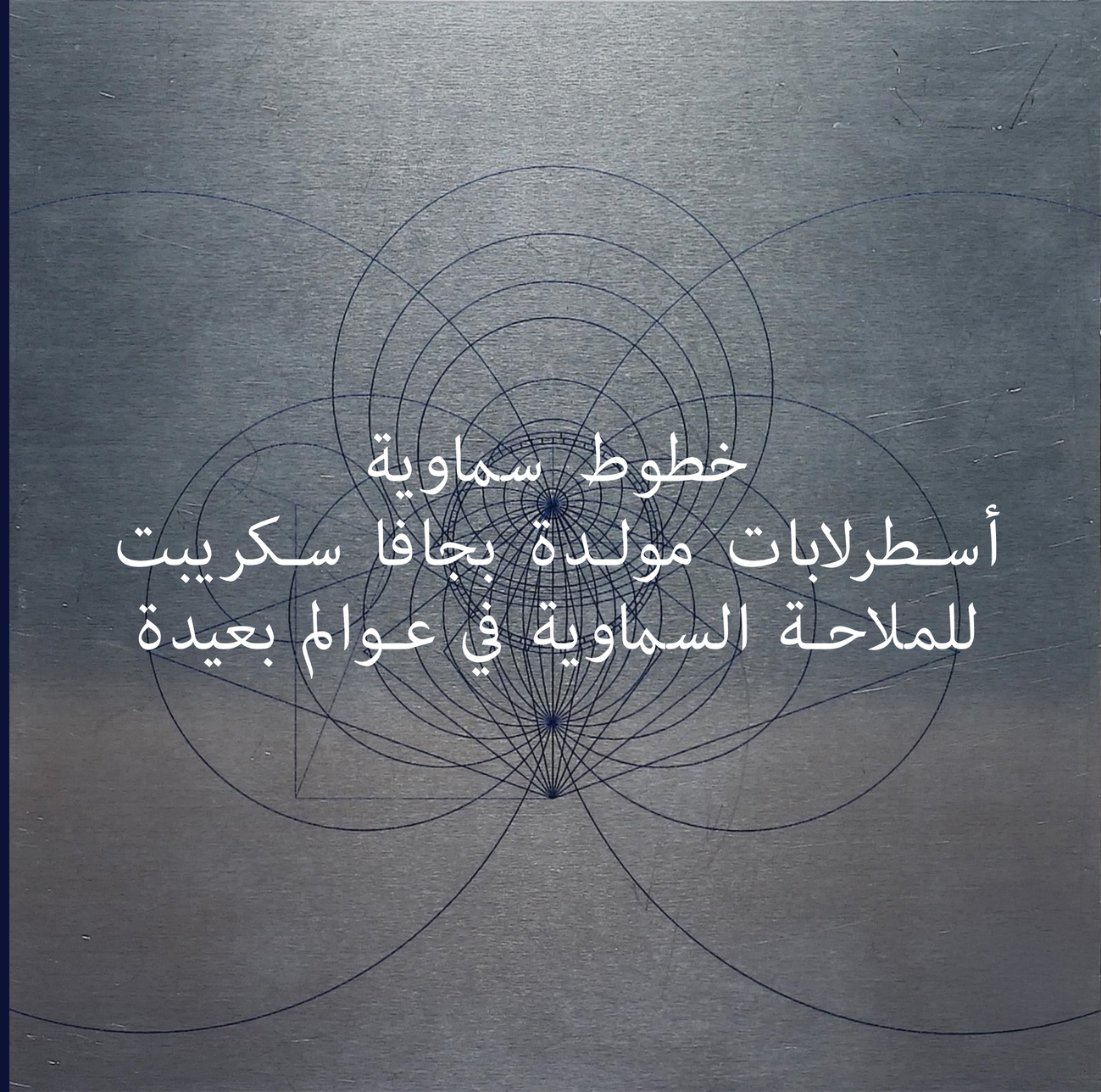
عطارد	Mercury
الزهرة	Venus
كوكب الأرض	Earth
القمر	Moon
المريخ	Mars
فوبوس	Phobos
فيستا	Vesta
سيريس	Ceres
المشتري	Jupiter
آيو	Io
زحل	Saturn
تيتان	Titan
أورانوس	Uranus
ميراندا	Miranda
نبتون	Neptune
ترايتون	Triton
أوركوس	Orcus
بلوتو	Pluto
شارون	Charon
هاوميا	Haumea
كواوار	Quaoar
ماكيماكي	Makemake
غونغغونغ	Gonggong
إريس	Eris
سدنا	Sedna



خطوط سماوية
أسطرلابات مولدة بجافا سكريبت
للملاحة السماوية في عوالم بعيدة

Heavenly Lines
JavaScript-Generated Astrolabes for Celestial Navigation on Faraway Worlds

Gary James Stilwell

HEAVENLY LINES

عطارد	Mercury
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Heavenly Lines
JavaScript-Generated Astrolabes for Celestial Navigation on 25 Faraway Worlds

An astrolabe is a sophisticated instrument that measures the position of celestial bodies and functions as an analog calculator for navigation, time-keeping, and surveying. Used across Classical Antiquity, the Islamic Golden Age, and the European Age of Discovery, it served as both an observational tool and computational device.

Abū Ishāq Ibrāhīm al-Zarqālī (1029–1087) worked during the eleventh century in Toledo, Islamic Spain, where he compiled the Toledan Tables and created the first universal astrolabe, an instrument that could function at any latitude on Earth. The lunar crater Arzachel was named in his honor, from the Arabic al-Zarqālī al-Naqqāsh, "the engraver."

Inspired by al-Zarqālī, this project presents astrolabes for 25 celestial bodies in our solar system, from Mercury to distant Sedna. Initiated during an MIT Fellowship in the course "Recreate Experiments from History," they were generated in p5.js, a JavaScript library for creative coding, and exhibited in MIT's Wiesner Student Art Gallery.

At its core, the work unites medieval Islamic astronomical methods with contemporary computational tools. The same geometric principles that positioned circles on brass instruments now execute as JavaScript algorithms, transforming NASA planetary data through centuries-old stereographic projection formulas.

The mathematics hasn't changed; only the medium. Where al-Zarqālī consulted trigonometric tables, this code executes the functions in binary. Where he engraved calculated positions onto brass plates, digital algorithms render them as images. Ancient astronomical wisdom, preserved through Arabic translations and transmitted across cultures, finds new expression in modern programming languages.