project #7

Towne Hall Clock

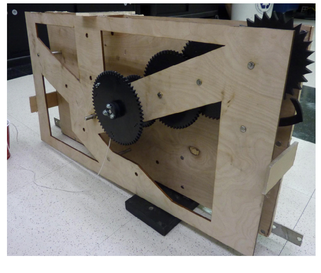
Reed Lerner
Andrew Tam
Alikhan Sapargaliyev

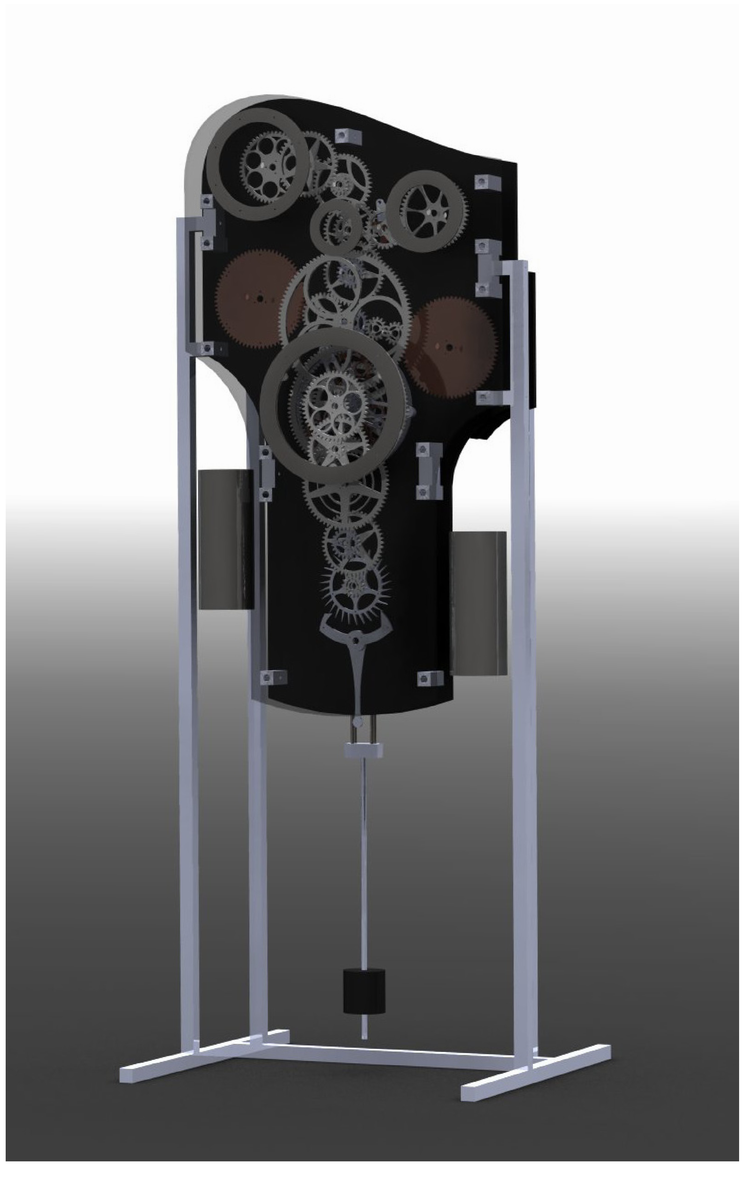
Advisor
Dr. Robert Jeffcoat

Abstract

Our main goal was to create a clock that would educate, entertain, and keep accurate time. We have made a fully functional mechanical clock that is powered by counterweights and regulated by a recoil escapement. This exact technology has existed for hundreds of years, yet our clock includes unique mechatronic systems. These mechatronics correct the time every hour and automatically rewind the counter weights. The clock keeps its own time signal while tracking what time the mechanical clock is displaying using a custom optical encoder. Every hour it then corrects the time discrepancy by using a motor to drive a planetary gear system. In addition, optical sensors detect when the weights have reached the bottom and trigger DC motors to rewind them. Our gears and backboards are laser cut from ABS plastic, all shaft is 3/8" precesion stainless steel, and the structure is aluminum. The escapement is composed of a brass verge and an aluminum wheel. We have created a clock that seemlessly blends pure mechanics with modern electronics while exposing all horological workings and maintaining a high aesthetic standard.

Early Prototype





Displays

The clock displays time, day of the week, phase of the moon, and a 24-hour dial showing where in the world it is currently noon.

Planetary gear and Encoder

Allows for the adjustment of the time without interference with the movement of the clock. The encoder enables the electronic clock to keep track of what time the mechanical clock is displaying.

Electronic clock

Keeps time by using the 60Hz alternating current from a wall outlet.

Driving Weights and Rewinding mechanism

Provides the mechanical power for the clock and the pendulum to run. Rewinds using optical sensors and DC motors powering ratchet wheels. (not pictured on right)

Pendulum and Escapement

Controls the movement of the clock by providing a steady periodical signal. The pendulum oscillates with a two second period regulated by a brass recoil escapement.