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Konrad Wachsmann's Shift from Product to Process:

Prefiguring Automated Industrialized Building in Architecture through Developments in "Universal" Building Machines

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Context

This research project employs a singular self-built three-axis gantry-based machine as a base for modification and testing of processes toward the development and definition of a universal building machine (U.B.M.). This machine is derived from research of the Local Orientation Manipulator's (L.O.M.) seven degrees of freedom, 20-in. sphere of motion, and ability to participate in simulations of building assembly. As prefigured and defined by the work of Konrad Wachsmann, a UBM 1) processes material, 2) handles material, 3) fabricates components, and 4) assembles system components. In addition, universality further defines it is efficient, unskilled, mobile, scaleless, and flexible/adaptable.

Methods

The methodology utilized for this research uses the U.B.M. to create building components. These components will then be evaluated in the context of a built system and the analysis will be used to modify and improve the machine. The U.B.M. will be informed the entire time by the L.O.M. produced by Wachsmann, principles of the universal, and open-source methods of design, fabrication, and distribution.

Contributions

It is expected that this research project will make contributions to: 1) the development of automated and open-source building machines in architecture; 2) the scholarship and historical understanding of the work of Wachsmann through the digital and potential physical reconstruction of the lost L.O.M.; and 3) offer an example of a methodological approach authentic to architecture that engages scholarship in a dialogue with making.

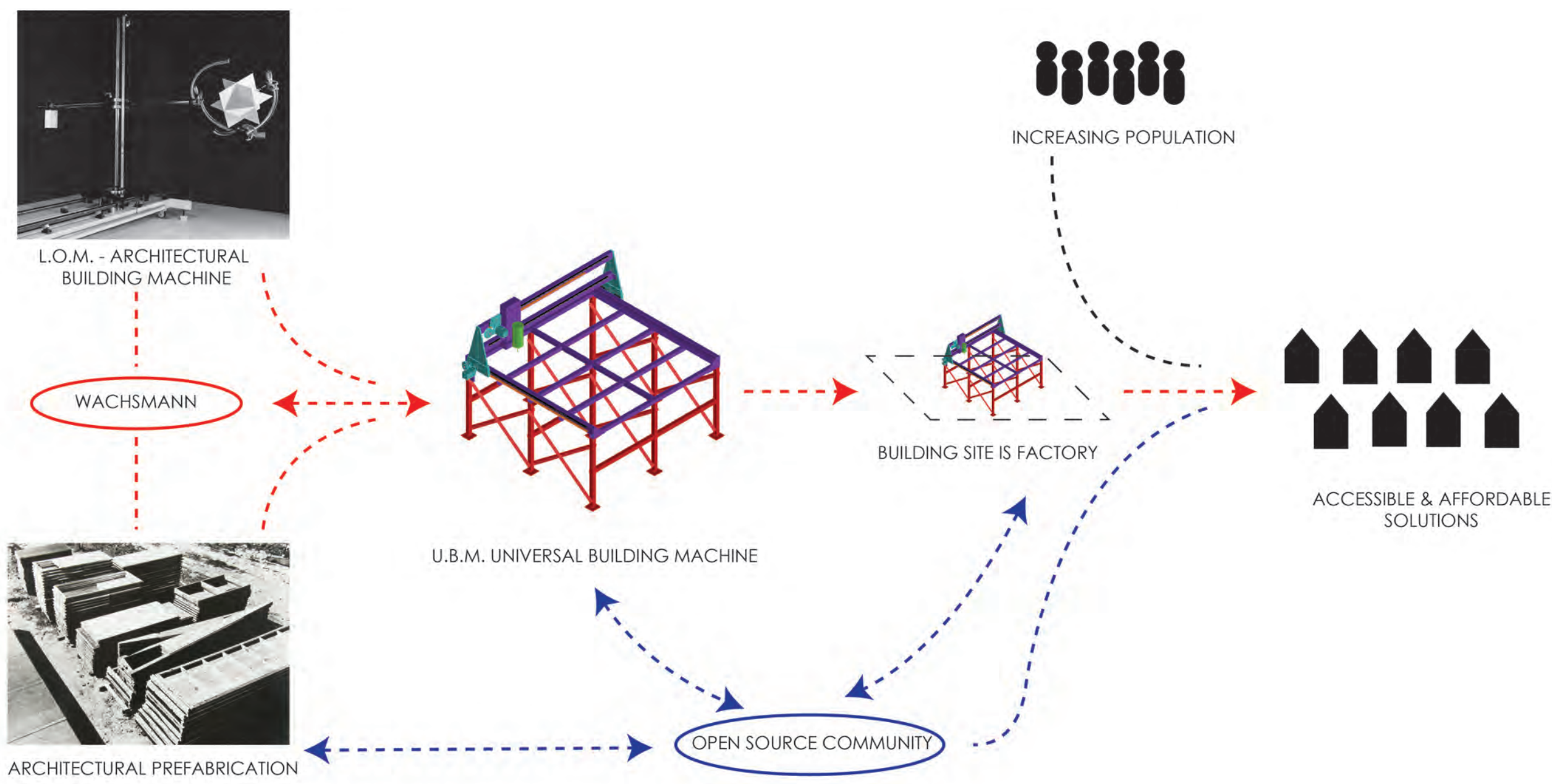


IMAGE CREDIT: ELIZABETH ANDRZEJEWSKI

U.B.M. Project Map

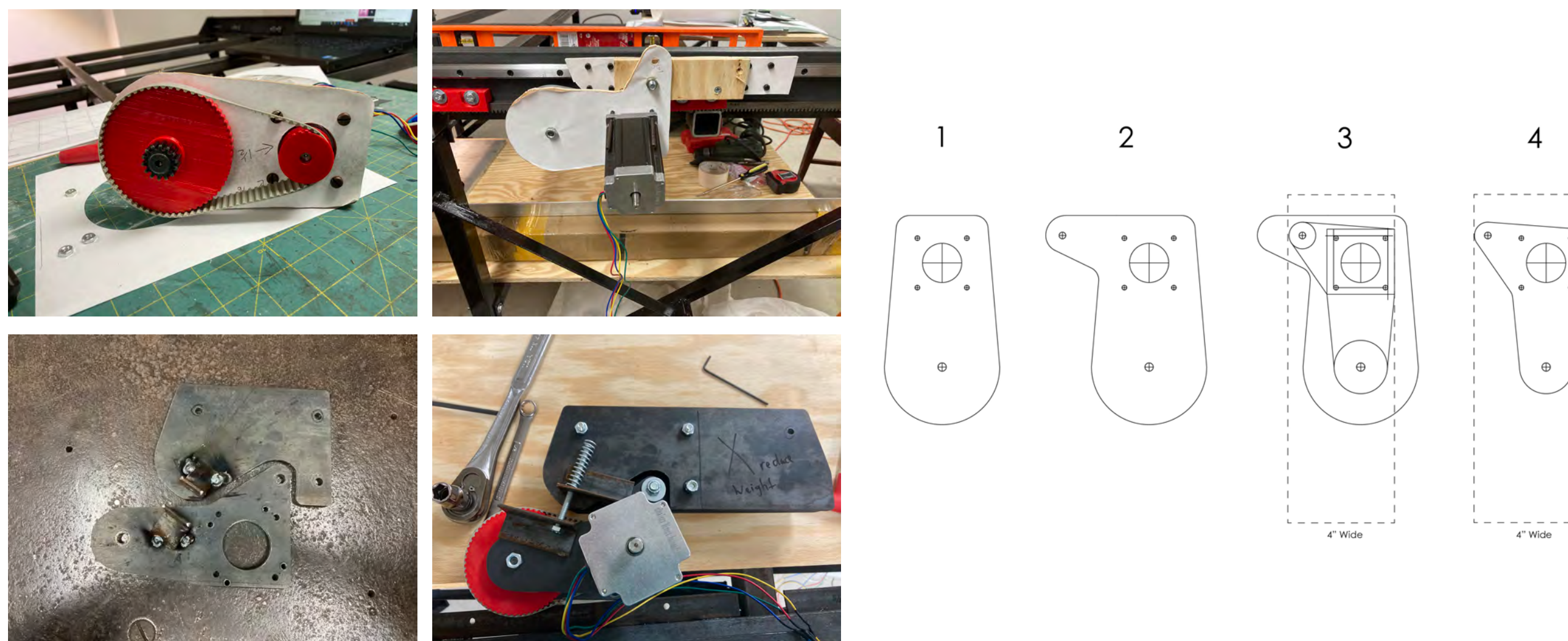


IMAGE CREDIT: ELIZABETH ANDRZEJEWSKI.

With accessibility in mind, the U.B.M. is being developed according to the following guidelines: 1) minimize tools used; 2) minimize materials used; 3) fewest number of parts possible used; 4) system of templates, patterns for unskilled assembly; 5) imperial and metric version; 6) one-to-two people maximum needed to build and operate machine; 7) have the ability to be disassembled, moved, and reassembled; 8) modifiable and upgradeable; and 9) packaged for open-source distribution. The examples shown highlight this iteration process which considers available materials and efficiency. The drawing above shows the development of the transmission plate for the linear motion of the UBM. The first iteration was used to gain the proper alignment of holes. The part then evolves to avoid other components, reduce material weight, and fit on a 4" wide piece of .25" thick steel, which is a standard size and already used for other parts of the machine.

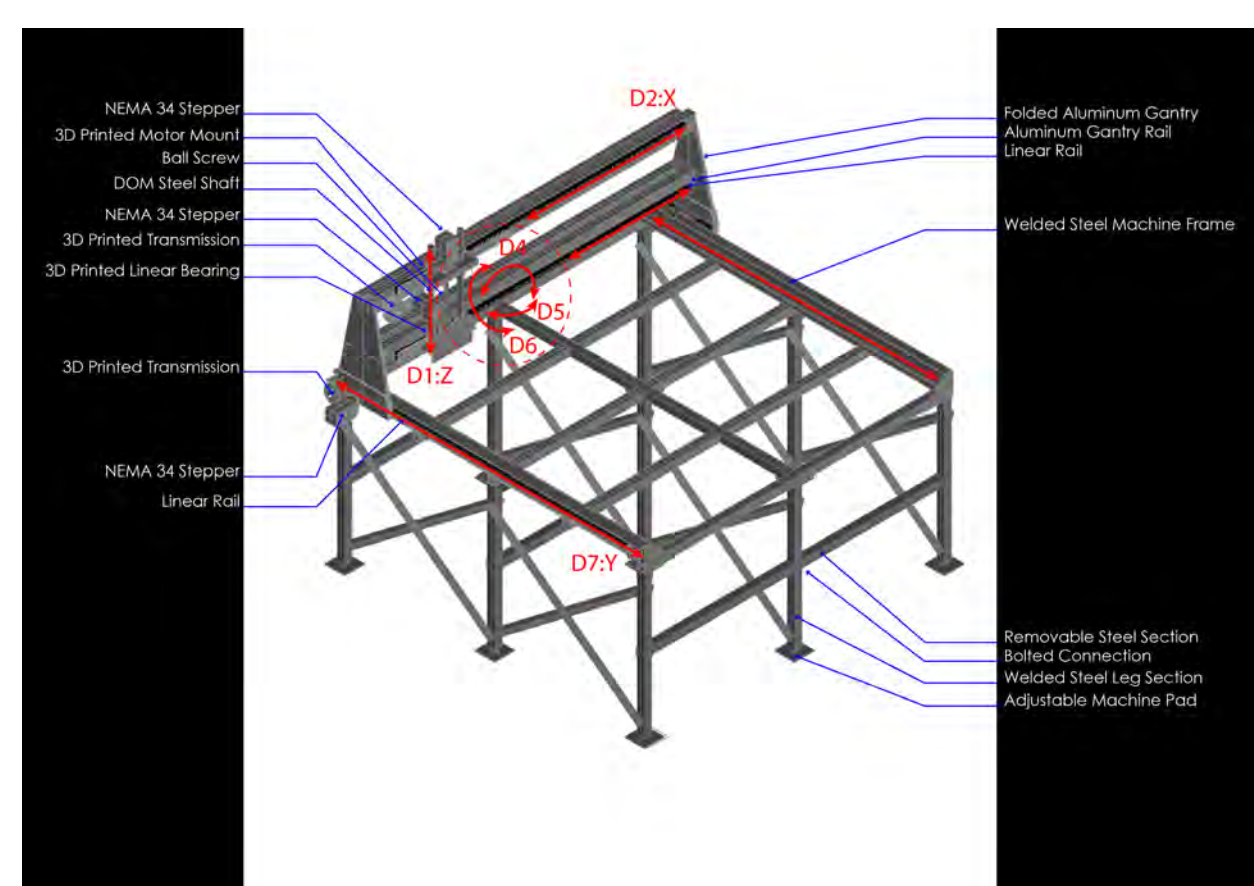


IMAGE CREDIT: ELIZABETH ANDRZEJEWSKI

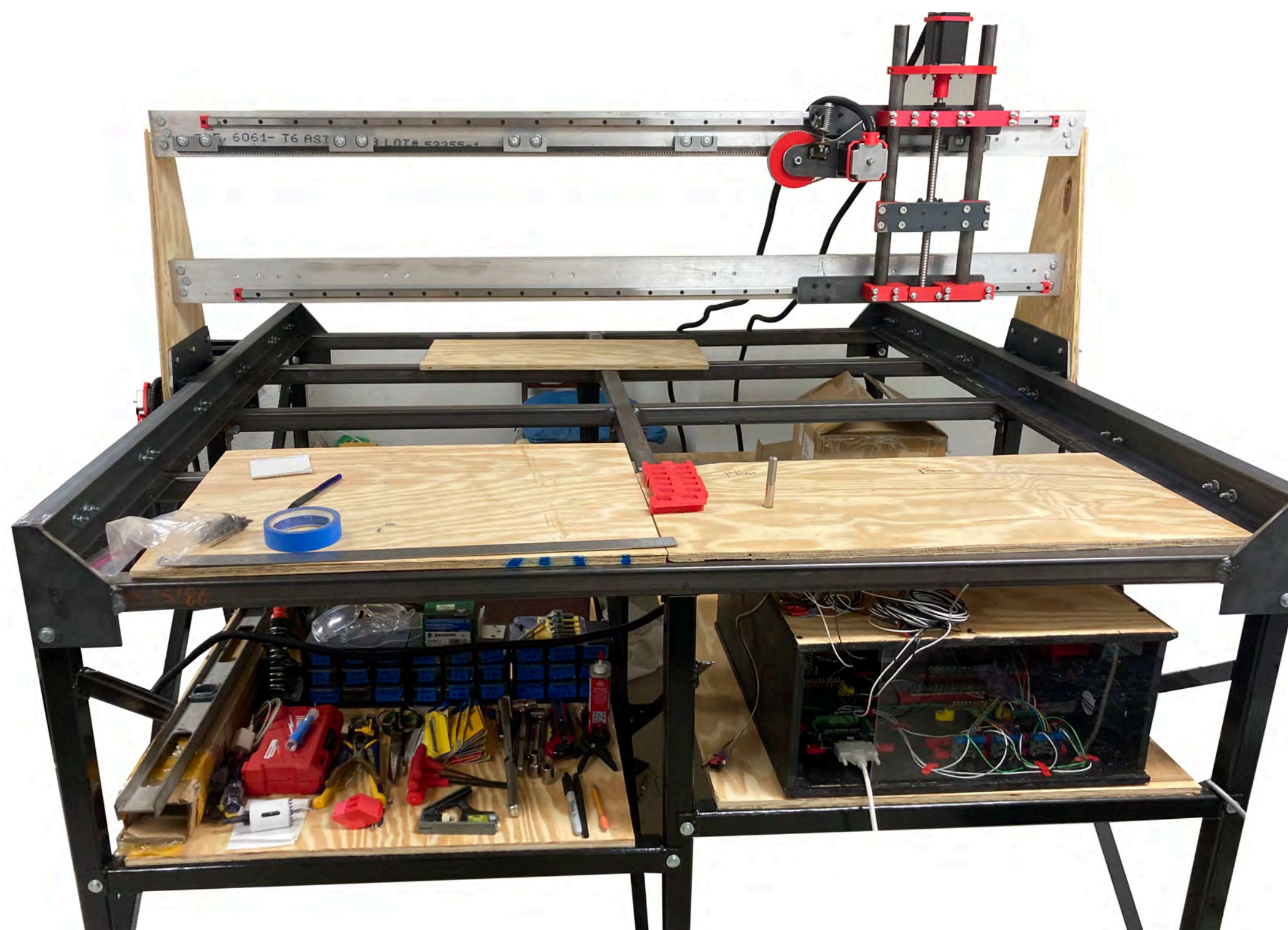


IMAGE CREDIT: ELIZABETH ANDRZEJEWSKI

Current iteration of the U.B.M.

