PROGRESS REPORT N°1

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Robotic motion in archeological environments

The TRACES project consist in the creation of a robot that could work alongside humans during archeological surveys. It would be a precise and untiring workforce, capable of cataloging finds, samples and features properly, locating artifacts underground and taking them through every step necessary to ready them for lab analysis. It should withstand tropical climate conditions, and its materials have to be commercially available or replaceable with 3D-printed pieces.

Capable of retrieving objects from underground and taking them through the entire cleaning process, A.C.E, the Archaeological Cobotic Explorer, will help archaeologists in their day to day activities and ensure more productive research.

It should be able to operate within 1m*1m*5m trenches with straight walls, where it will have to dig, evacuate the sediments, collect the found artifacts and record the extraction process, recognize and photograph the retrieved items, locate where those were found, and store and/or transport them to the next stage of operations. Then, it should identify the items, sieve sediments, clean the artifacts, put them in bags and finally stick a QR code to it, summarizing all the necessary information about the artifact within it. Also, the archaeological sites are often located in places difficult to access, which requires either that the robot can travel through difficult terrain or that it can be easily carried around.
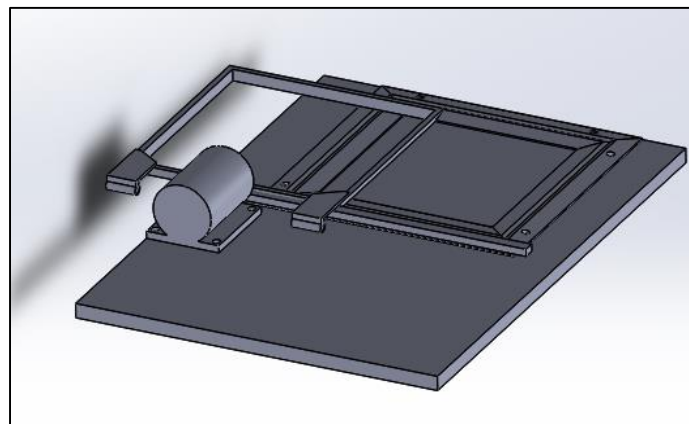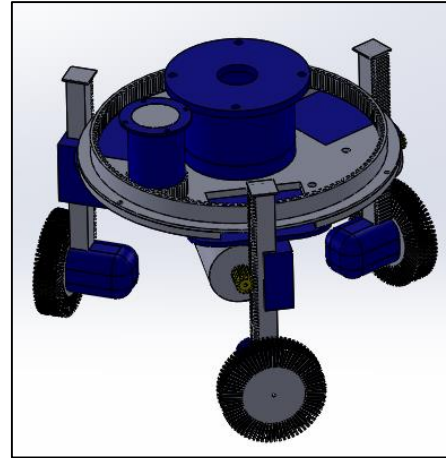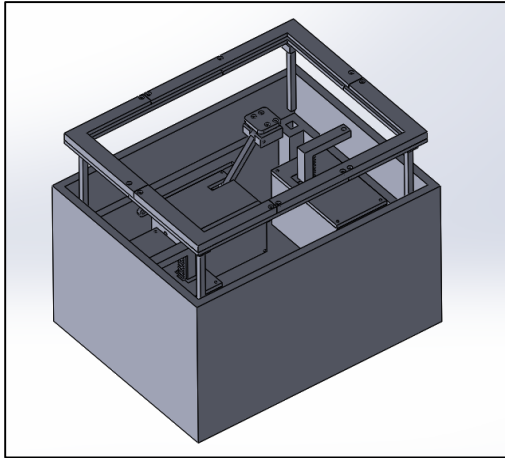
The explorer
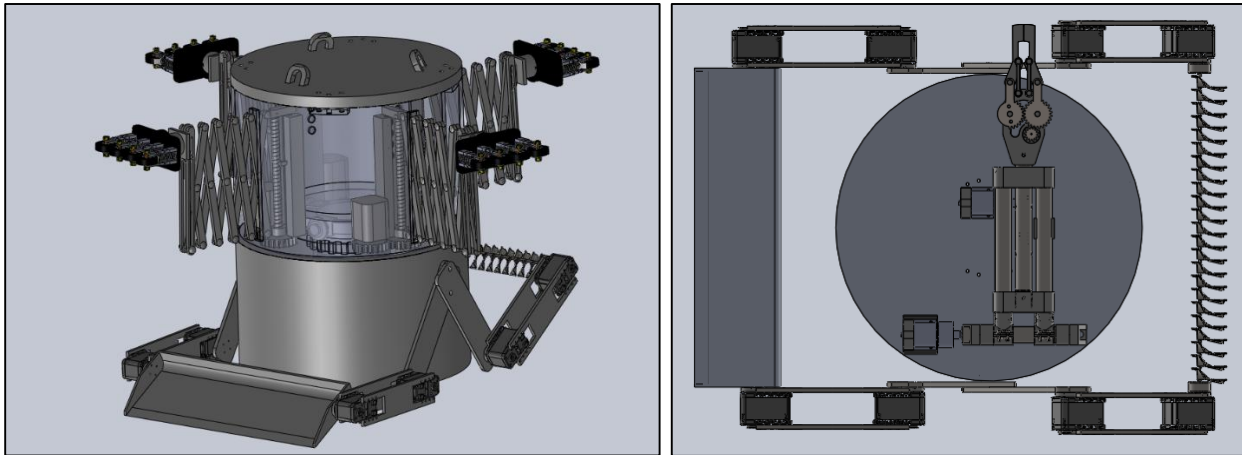
It is the working part in the trenches with three specific functions : digging, evacuate sediments and collecting the artifacts. The upper part is fixed and connected to the "mobility system" allowing it to move up and down on the z axis. The bottom part can move in rotation and ensures the three functions.

The mobility system
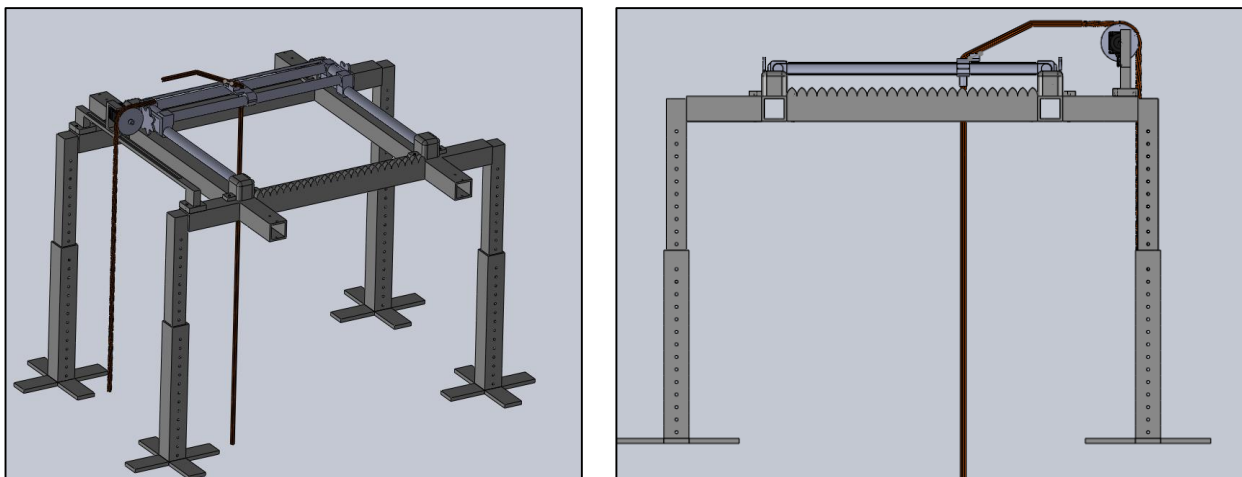
This part is located above the trench and allows the vertical movement of the explorer on the z axis.

# The washing machine – Sieving / Cleaning / Bagging

Once the object and the soil around it is collected by the explorer, he first places it on the sieving. Its function is to remove the excess soil and keep it to put it back in the trench. Once it's done the object goes to the cleaning.

The cleaning module uses brushes to remove the remaining soil. Artifacts are not systematically sent to the cleaning module, in cases where the module is too fragile.

Finally, the bagging module puts the artifact in a bag with a QR code listing the information of the latter : number of the trench, x,y,z position when it was found, shape and description of the object, photo in the trench.

The foam arms
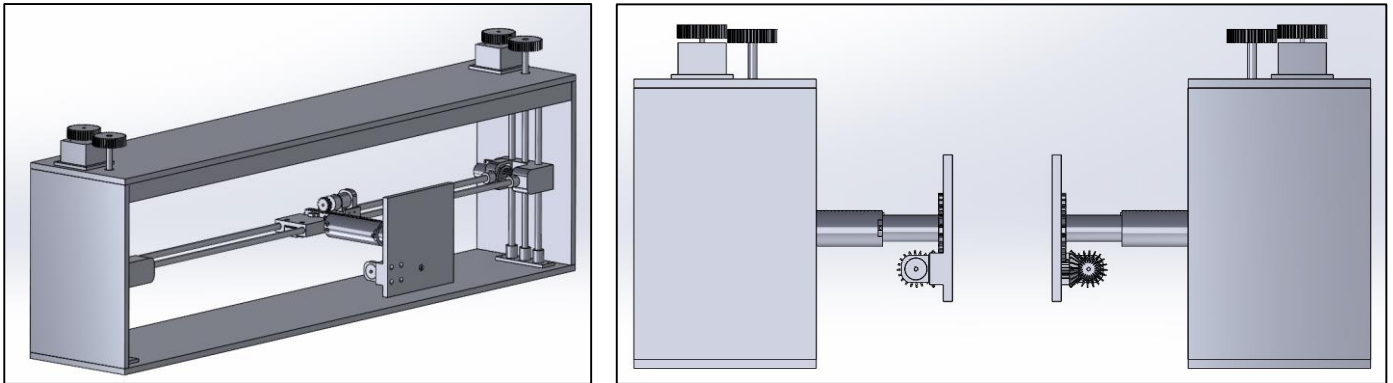
This part allows to recover the object in exit of trench and to make it transit between the 3 modules of sifting, cleaning and packaging.