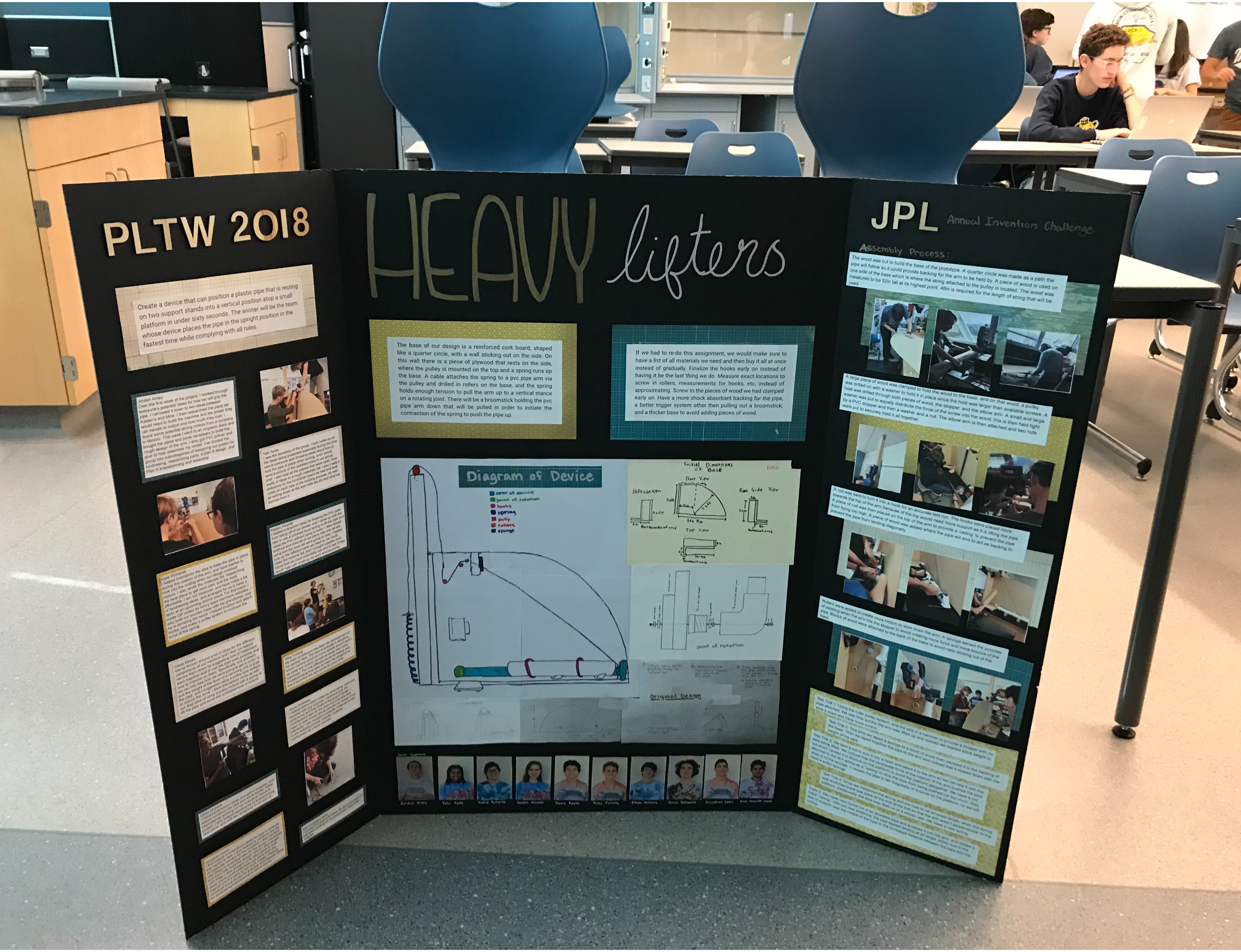
PLTW 2018
Create a device that can position a plastic pipe that is resting on two support stands into a vertical position atop a small platform in under sixty seconds. The winner will be the team whose device places the pipe in the upright position in the fastest time while complying with all rules.
HEAVY lifters
The base of our design is a reinforced cork board, shaped like a quarter circle, with a wall sticking out on the side. On this wall there is a piece of plywood that rests on the side, where the pulley is mounted on the top and a spring runs up the base. A cable attaches the spring to a pvc pipe arm via the pulley and drilled in rollers on the base, and the spring holds enough tension to pull the arm up to a vertical stance on a rotating joint. There will be a broomstick holding the pvc pipe arm down that will be pulled in order to initiate the contraction of the spring to push the pipe up.
If we had to re-do this assignment, we would make sure to have a list of all materials we need and then buy it all at once instead of gradually. Finalize the hooks early on instead of having it be the last thing we do. Measure exact locations to screw in rollers, measurements for hooks, etc, instead of approximating. Screw in the pieces of wood we had clamped early on. Have a more shock absorbant backing for the pipe, a better trigger system other then pulling out a broomstick, and a thicker base to avoid adding pieces of wood.
Diagram of Device
arm of device
point of rotation
hooks
spring
pully
rollers
sponge
Initial Dimensions of Base
Front View
Top View
Side View
point of rotation
Original Design
JPL Annual Invention Challenge
Assembly Process:
The wood was cut to build the base of the prototype. A quarter circle was made as a path the pipe will follow so it could provide backing for the arm to be held by. A piece of wood is used on one side of the base which is where the string attached to the pulley is located. The wood was measured to be 52in tall at its highest point. 48in is required for the length of string that will be used
A large piece of wood was clamped to hold the wood to the base, and on that wood, a pulley was drilled on with a washer to hold it in place since the hold was larger than available screws. A hole was drilled through both pieces of wood, the stopper, and the elbow arm. A small and large washer was put to equally distribute the force of the screw into the wood, this is then held tight by a PVC stopper and then a washer and a nut. The elbow arm is then attached and two nuts were put to securely hold it all together
A rod was bent to turn it into a hook for an accurate test run. The hooks were placed more towards the top of the arm because of the top would need more support as it is lifting the pipe. A piece of rod was then placed on the top of the arm to provide a 'ceiling' to prevent the pipe from flying too high. A piece of wood was added where the pipe will end to act as backing to prevent the pipe from landing diagonally
Rollers were added to create more friction to slow down the arm. A sponge served the purpose of padding when the arm hits the stopper to avoid creating more force and more bounce of the pipe. Blocks of wood were attached to the back of the base to avoid nails sticking out of the base.