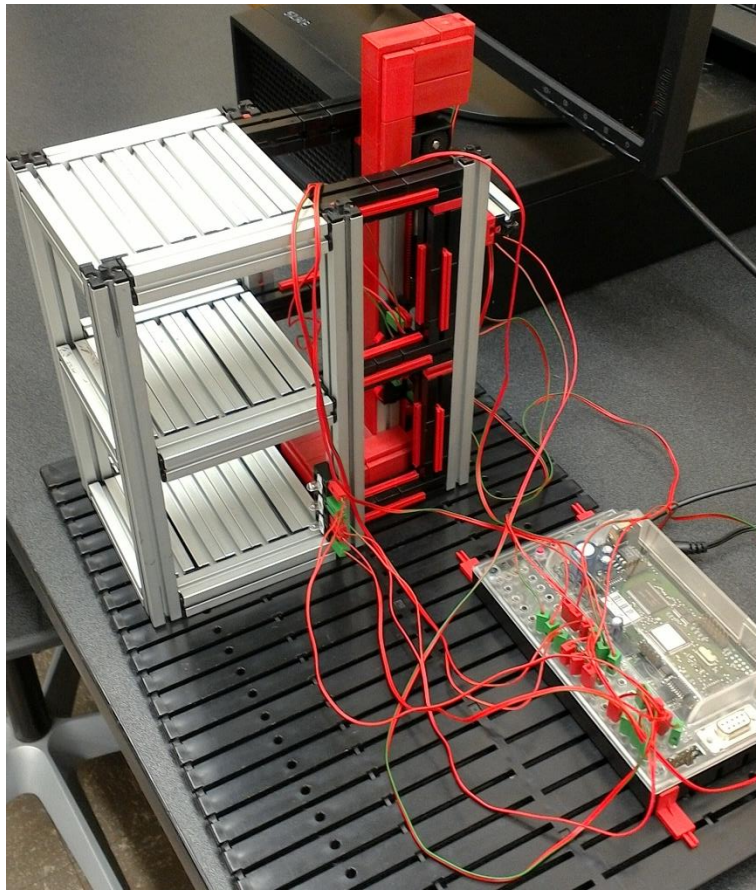# Elevator Prototype Project

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Designing Constraints

The elevator must be built out of fisher technic parts.

The elevator must be able to go between any combination of floors using switches within the elevator.

A light must be used on the ground floor to indicate which floor the elevator is on.

The elevator must return to the ground floor after a user designated period of time.

The code must fully complete all parts of the flowchart program.

Build

Building the elevator consisted of 7 main systems: the motor, the elevator, floor selectors, the floor detectors, the floors, the lights, and the controller.

The Motor

The motor is just a motor connected to a track gearbox that is fixed vertically to the structure of the building so that it sits at the same level as the third floor. It is wired M1 on the controller directly.
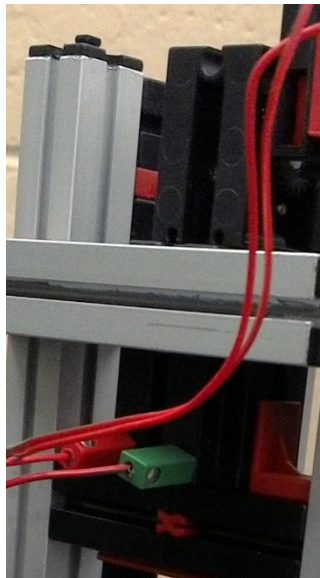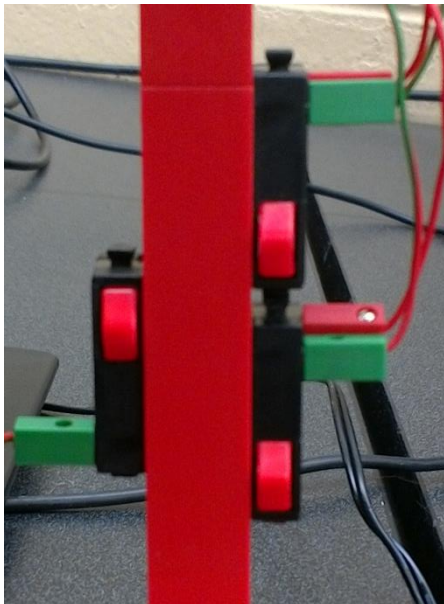
The Elevator

The elevator is just a platform made to fit within the elevator shaft and activates the floor selectors. There is a track on the back of the vertical pole so that it can be moved up and down with the motor. There are slight protrusions on the back of the elevator platform so that it can click the floor detectors and a mass on the top of the elevator so that it is more balanced.
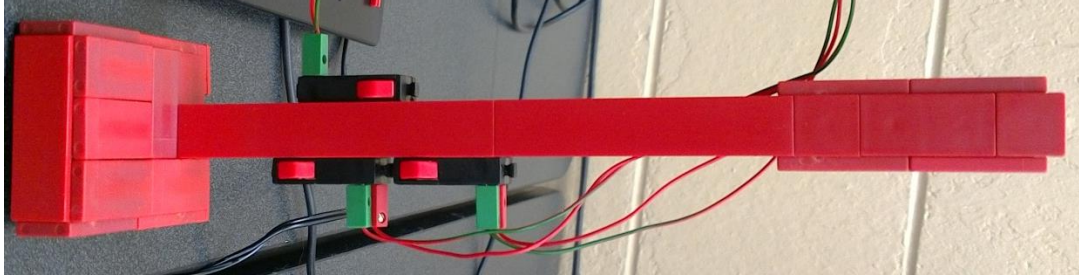

The Floor Selectors

The floor selectors are the three switches located on the vertical shaft of the elevator. They are wired directly to the controller in the I1, I2, and I3 slots. I1 is the first floor, I2 is the second, and I3 is the third. They are arranged from lowest number on the bottom moving up. The I1 and I3 floor are on the right of the elevator, with I1 on the bottom and I3 on the top. I2 is on the left of the elevator. The wires run up and out of the top of the elevator, and there have been no issues with the wires getting caught or unplugged.

The Floor Detectors

The floor detectors are located on the back side of the elevator shaft on the left. They are attached so that they can be moved up, down, in, and out so that they can be tuned to get activated by the elevator every time but not get in the way of the elevator. They are wired to the I4, I5, and I6 slots on the controller directly. I4 is the detector for the first floor, I5 is the detector for the second floor, and I6 is the detector for the third floor.
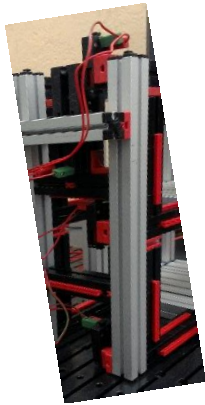

The Floors

The floors are simply made so that the prototype gives the viewer a better idea of how the elevator will work in relation to the location of the floors of the building. They are made out of metal parts to help distinguish them from the rest of the build. They do provide structural stability for one of the sides of the elevator, but they could be removed and replaced to give a better view of the elevator itself with no sacrifices to stability.
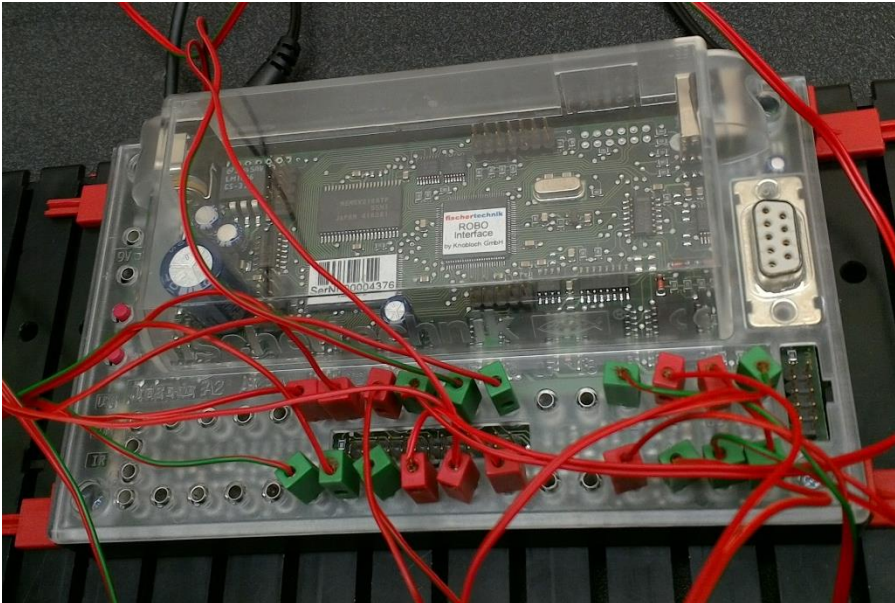
The Lights

The lights are located on the ground floor and are used to indicate what floor the elevator is on. They are wired into the M2, M3, and M4 slots and indicate the first, second, and third floor respectively.
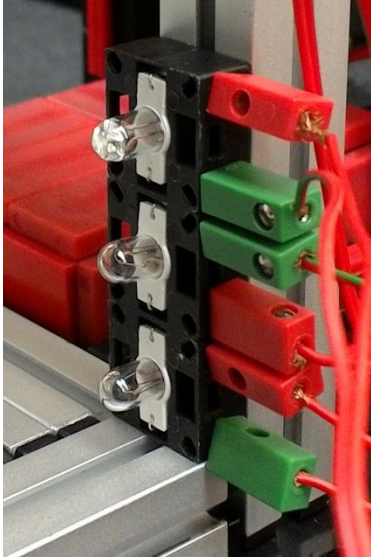

The Controller

The controller is what everything plugs into and controls every element of the elevator. It is the bridge between the code and the build.

The Code

The code is made up of a couple different parts. There are the commands to move to the first and third floors, the command to move to the second floor, the auto-return command, and the auto command clock override.
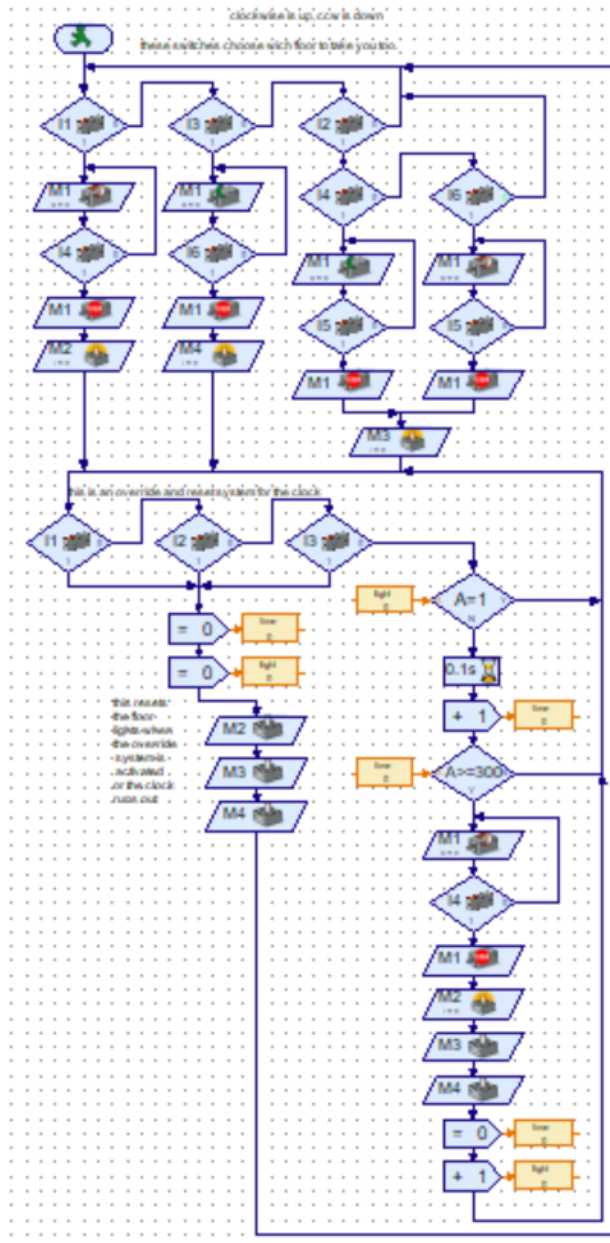
First and Third Floor Commands

This was the easiest part of the code because all it had to do was run the motor in the correct direction until it interacts with the floor sensor. It then turns the floor light on.
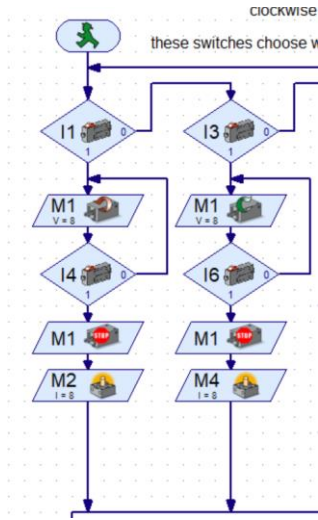

The Second Floor Commands

The second-floor commands are similar to the first and third floor commands, only it has to know what floor it is on to determine whether it needs to go up or down. If it can't determine what floor it is on, it simple doesn't move and loops back so any of the other floors can be selected. If it detects what floor it is on, it runs the motor in the correct direction until it reaches the second floor and then it tuns the second floor light on.
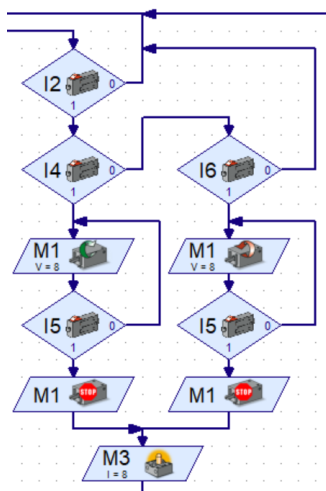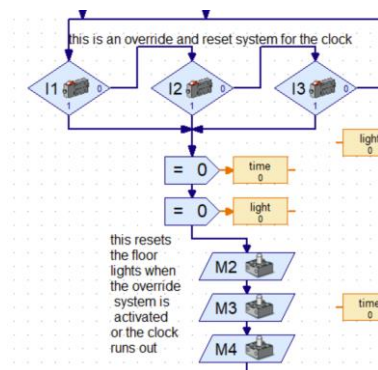
The Auto Return Commands

the code will loop adding to the counter "time" once every 1/10 of a second until it reaches 300. This is done so that the over ride code has a quick enough refresh rate that it works reliably. Once it reaches 300, it runs the motor in the correct direction until it reaches the first floor. It then stops the motor, turns on the first floor light, and turns off the second and third floor (even though one will already be off). After this, it resets the "time" counter and makes the "light" variable 1. This variable is used in the override system to allow for the lights to be reliably reset after it had auto-returned.
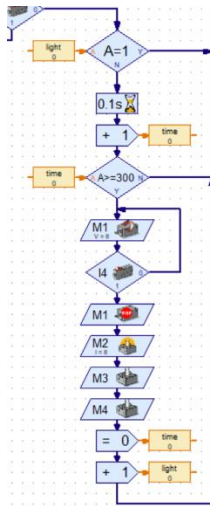
The Override Commands

The override system is a part of the auto return clock commands. It is used to reset the clock and override it if any floor is selected before the elevator returns to the starting floor. If any of the switches are pressed to select a floor, it resets the "light" and "time" variables to 0. It is worth noting that once the auto return commands are finished they feed into this loop that detects when the switches are pressed. After they have been pressed, they reset the afore mentioned variables and turn all of the lights off. It feeds into the original floor selection systems, which will work off of the same button press.

Video Link

https://youtu.be/pDkHy6KS3dU