Design Document

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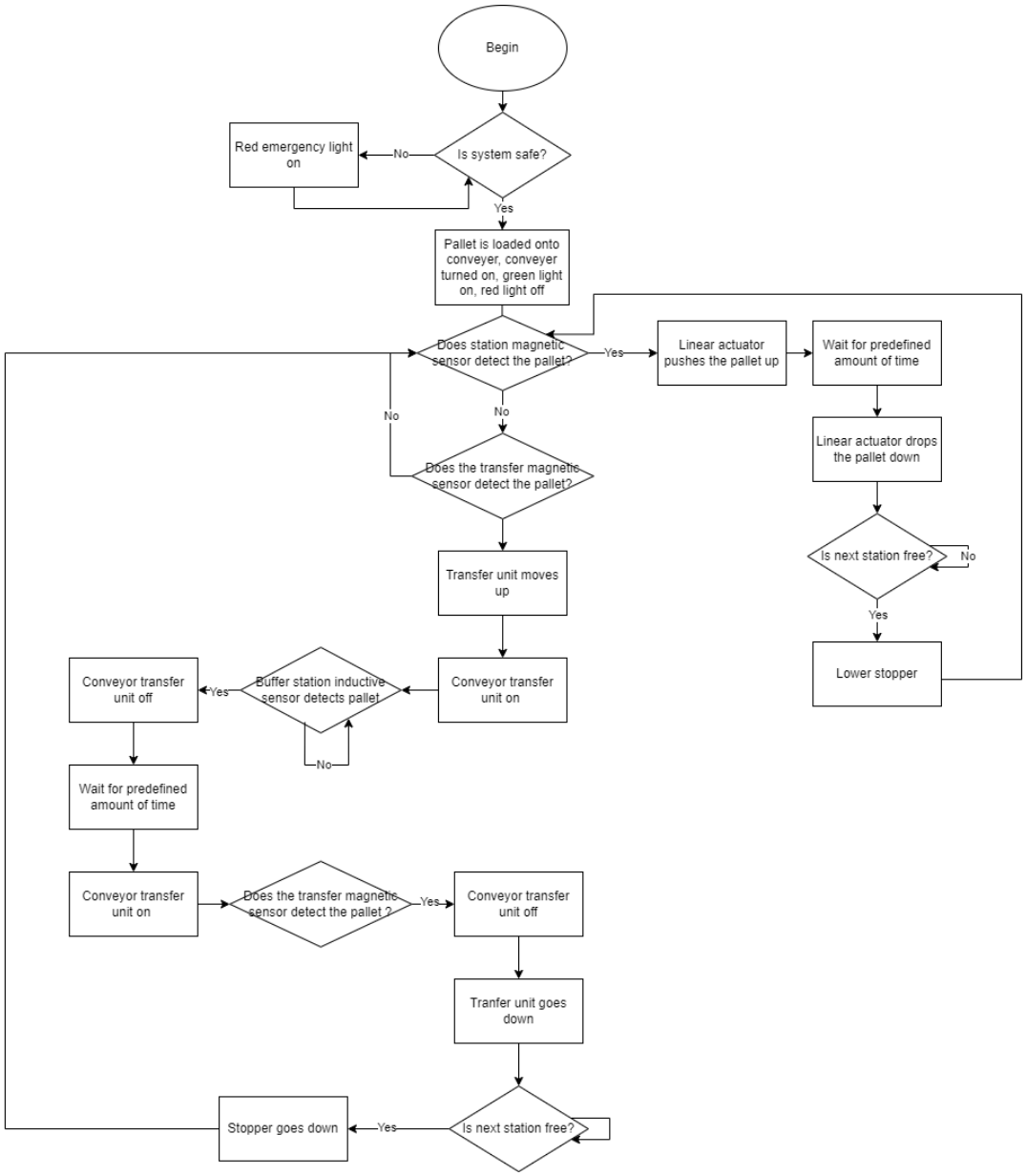
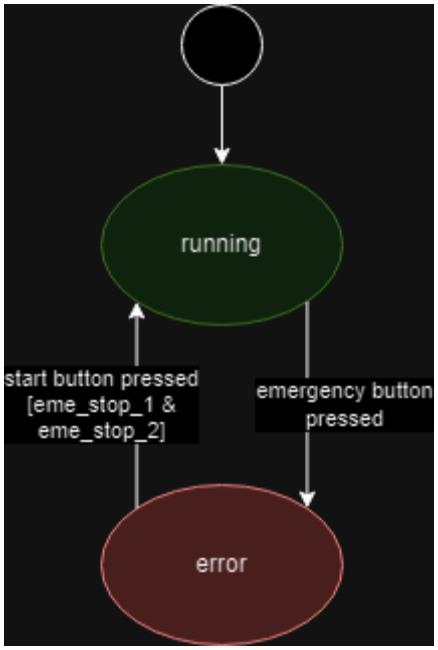
Flowchart

Below is the flowchart for the logic of the complete Mini-FLUFFY system. When the system safely stats, it does two checks: check if the transfer station sensor detects a pallet or if the magnetic sensor detects a pallet. If either of these actions occur, it will handle whatever needs to happen at that specific station. In case of the magnetic sensor on the main track, it will move up the stopper to make it wait for a certain amount of time and if needed, also move the linear actuator up to lift the pallet. We have a check in place to make sure the next station is available to lower the stopper, in case of multiple pallets. For the transfer unit, it will move the complete unit up. After this, the conveyor will be turned on and when it hits the induction sensor in the middle, it will stop for a specified amount of time. When it is done, it will continue moving until it hits another sensor which will make the unit go down. If the next station is free, it will lower the stopper then. This will work for multiple pallets, which is why we chose this design.



Flowchart for Mini-FLUFFY system

State diagrams

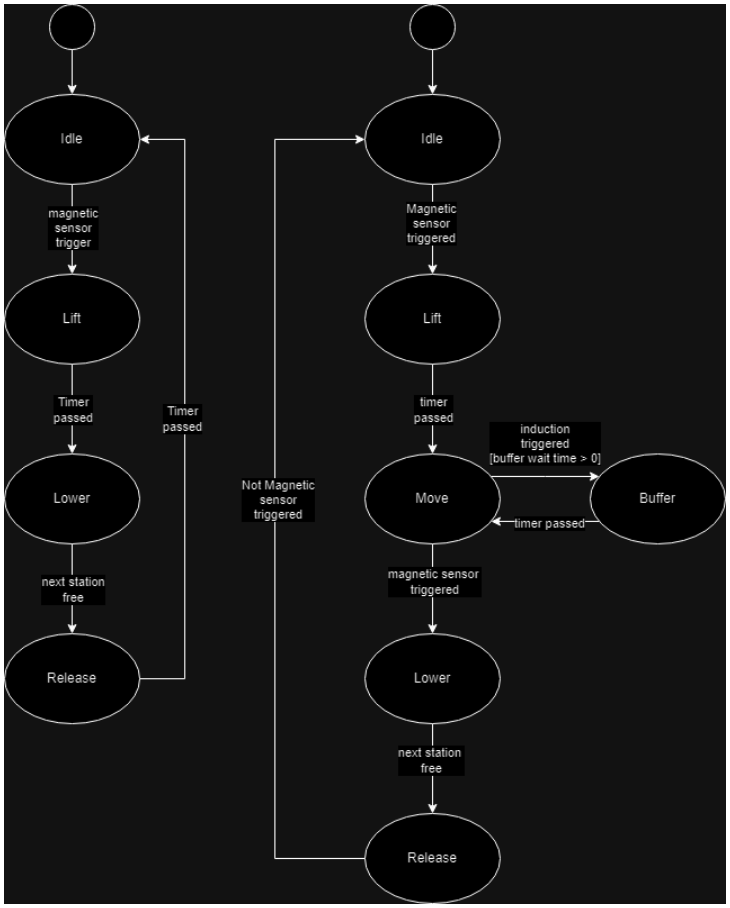


Main state diagram for Mini-FLUFFY

In this state machine you can see the major states of the Mini-FLUFFY. It has 2 basic states after startup: one in which the machine is operational and one in which the machine is shutoff until action is taken to ensure the machine has no further errors.

The running state will continuously run until the emergency button is pressed, at which point it will enter the error state. In this state you can press the start/reset button once the problem is resolved if the emergency button that was pressed is released. Otherwise, it will immediately return to the error state and not even start up again.

In this state diagram we have 2 separate diagrams for the sub states of the running state, each representing one of the types of stations contained within the Mini-FLUFFY.

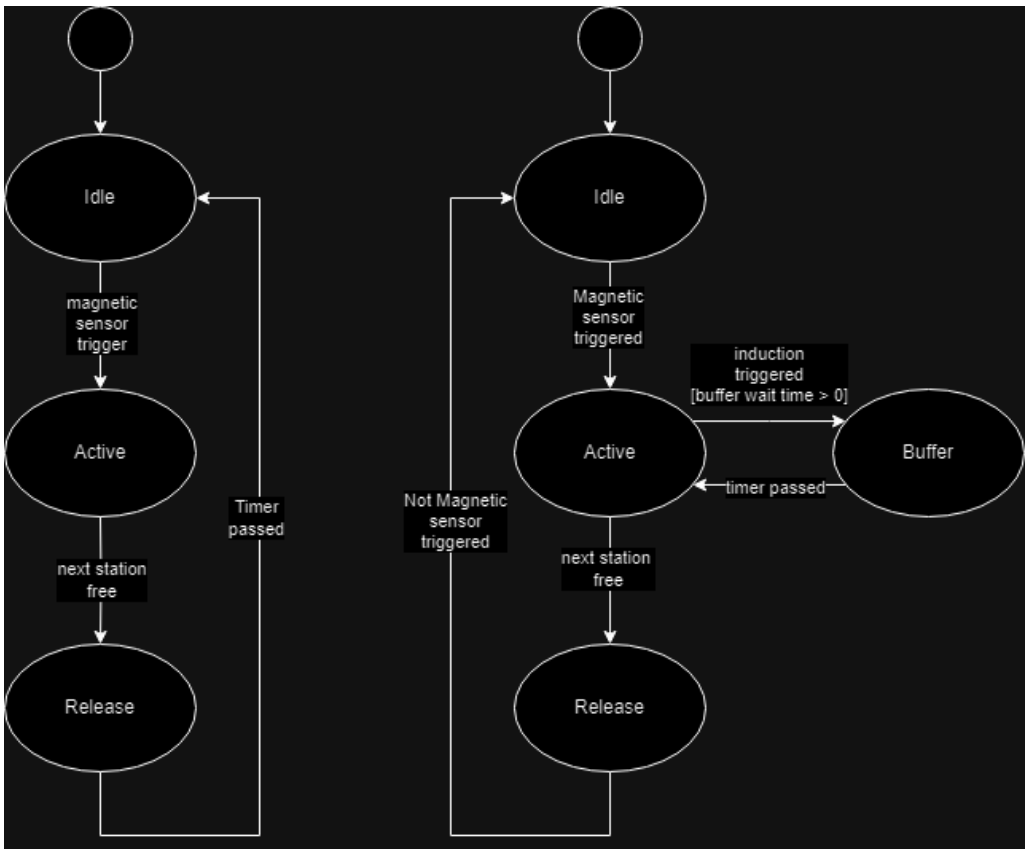


Substate diagram with lift station (left) and transfer station (right)

1. The first diagram shows the lifts station, a station which can lift up the platform of the belt for an action removed from the belt itself. It begins in the idle station until triggered by the accompanying magnetic sensor, at which point it will lift the platform up and wait until the timer runs out, after which it will lower and wait to allow the pallet to continue until the next station is cleared. Then it will reset the station back to idle.
2. The second diagram is used for the transfer station, which starts like the lift station.

Once triggered by the magnetic sensor it will lift the station up and move the pallet across. If the buffer timer has an active wait time, the pallet will be stopped in the buffer and wait for the time to pass. After which it will move through and finally be lowered. Once again it will wait until it's released by checking if the next station is free.

Here we have the new version of the state diagram. We have changed states such as lift, lower and move into a generic "active" state. We did this because these previous states were actions and when these actions ended we'd move on. What happens inside the active state is the same as before however.



Version 2 of the substate diagram