

Term Project: Robot Factory

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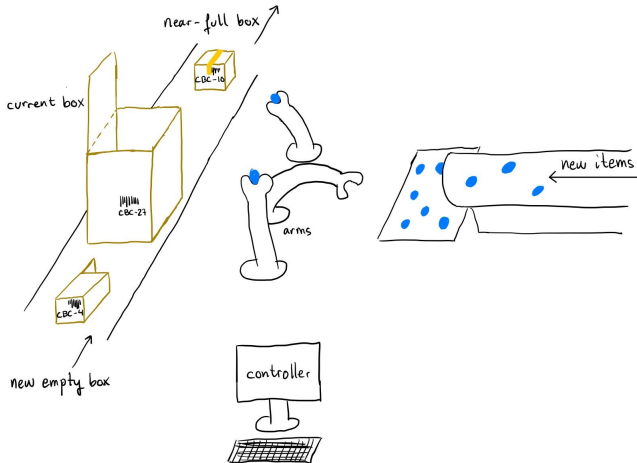
Overview

1 Introduction

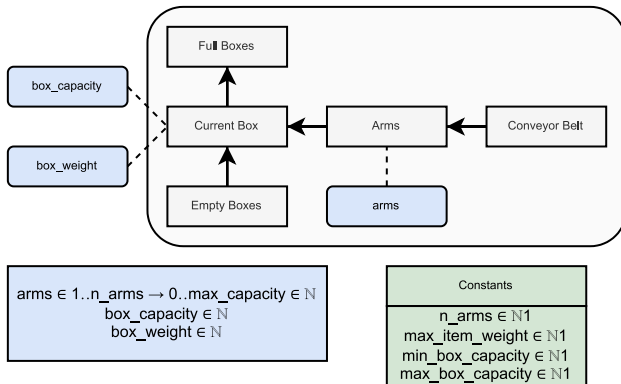
2 Model Variables and Events

3 Model Checking

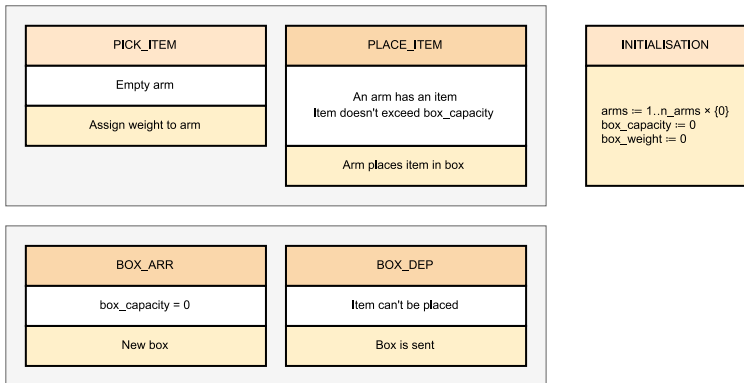
Intro



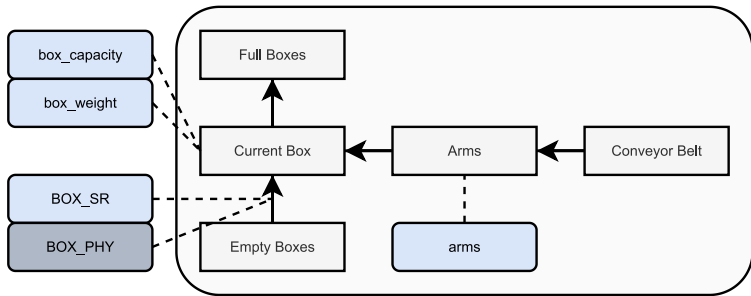
Model 0 Variables



Model 0 Events

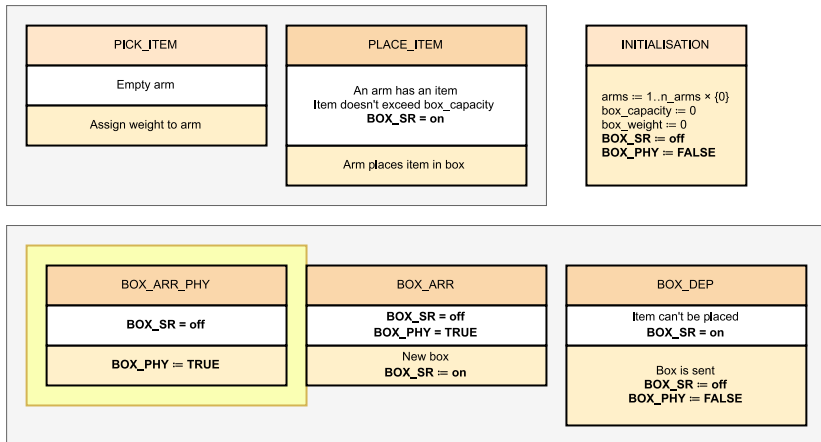


Model 1 Variables

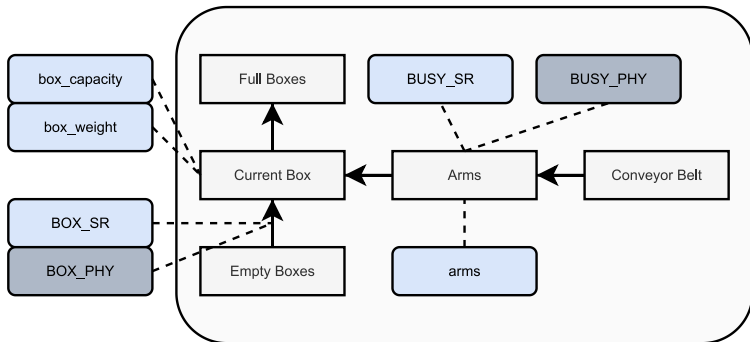


$\text{arms} \in 1..n_arms \rightarrow 0..\text{max_capacity} \in \mathbb{N}$
 $\text{box_weight} \in \mathbb{N}$
 $\text{BOX_SR} \in \{\text{on}, \text{off}\}$
 $\text{BOX_PHY} \in \{\text{TRUE}, \text{FALSE}\}$

Model 1 Events

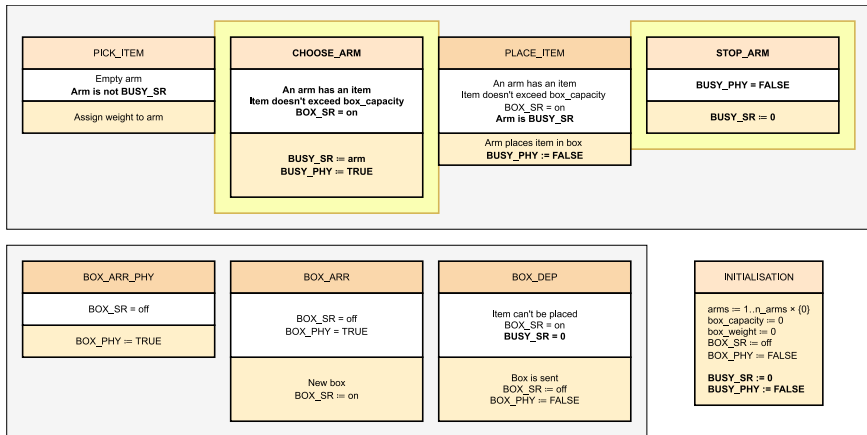


Model 2 Variables

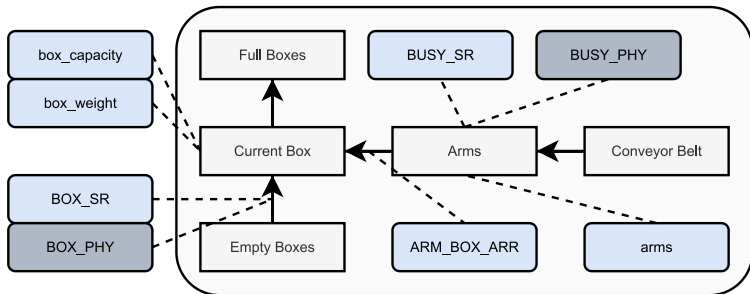


$\text{arms} \in 1..n_arms \rightarrow 0..max_capacity \in \mathbb{N}$
 $\text{box_weight} \in \mathbb{N}$
 $\text{BOX_SR} \in \{\text{on}, \text{off}\}$
 $\text{BOX_PHY} \in \{\text{TRUE}, \text{FALSE}\}$
 $\text{BUSY_SR} \in 0..n_arms$
 $\text{BUSY_PHY} \in \{\text{TRUE}, \text{FALSE}\}$

Model 2 Events



Model 2B Variables



$\text{arms} \in 1..n_arms \rightarrow 0..max_capacity \in \mathbb{N}$
 $\text{box_weight} \in \mathbb{N}$
 $\text{BOX_SR} \in \{\text{on}, \text{off}\}$
 $\text{BOX_PHY} \in \{\text{TRUE}, \text{FALSE}\}$
 $\text{BUSY_SR} \in 0..n_arms$
 $\text{BUSY_PHY} \in \{\text{TRUE}, \text{FALSE}\}$
 $\text{ARM_BOX_ARR} \in \{\text{on}, \text{off}\}$

Model 2B Events

PICK_ITEM
Empty arm Arm is not BUSY_SR
Assign weight to arm

PLACE_ITEM
Arm arrived to the box Arm is BUSY_SR
Arm places item in box Arm leaves

SIGNAL_ARM
An arm has an item Item doesn't exceed box_capacity BOX_SR = on BUSY_SR = 0
BUSY_SR := arm

MOVE_ARM_PHY
BUSY_SR ≠ 0 BUSY_PHY = 0
BUSY_PHY := BUSY_SR

ARM_BOX_ARR
Busy arm has item BUSY_PHY ≠ 0 BUSY_SR ≠ 0 BUSY_SR = BUSY_PHY
ARM_BOX_ARR := on

RESTORE_ARM_PHY
Busy arm is moving Busy arm has no item
Idleing busy arm

RESTORE_ARM_CTRL
Busy arm is moving Busy arm has no item
BUSY_SR = 0

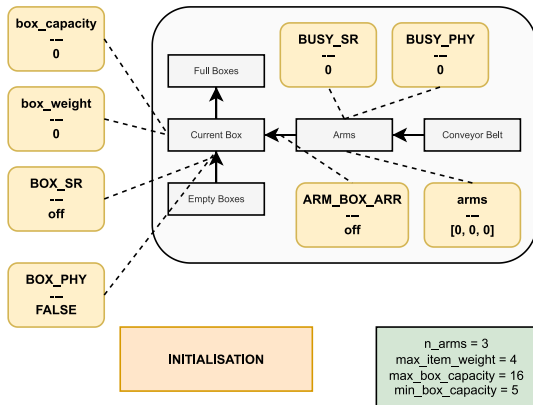
BOX_ARR
BOX_SR = off BOX_PHY = TRUE
New box BOX_SR := on

BOX_DEP
Item can't be placed BOX_SR = on BUSY_SR = 0
Box is sent BOX_SR := off BOX_PHY := FALSE

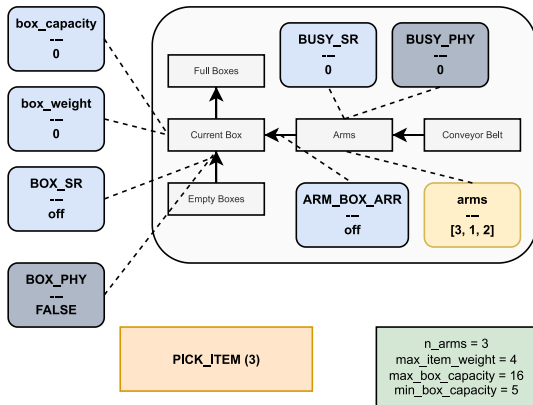
BOX_ARR_PHY
BOX_SR = off
BOX_PHY := TRUE

INITIALISATION
arms := 1..n_arms × {0} box_capacity := 0 box_weight := 0 BOX_SR := off BOX_PHY := FALSE BUSY_SR := 0 BUSY_PHY := 0 ARM_BOX_ARR := off

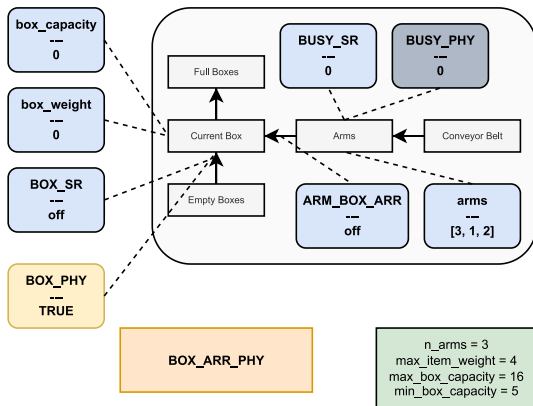
Model Checking: 0 INITIALISATION



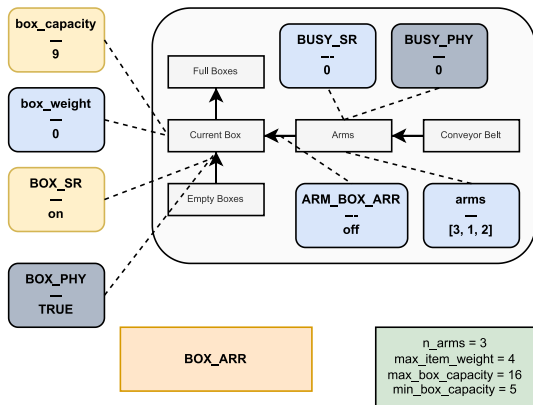
Model Checking: 1 PICK_ITEM



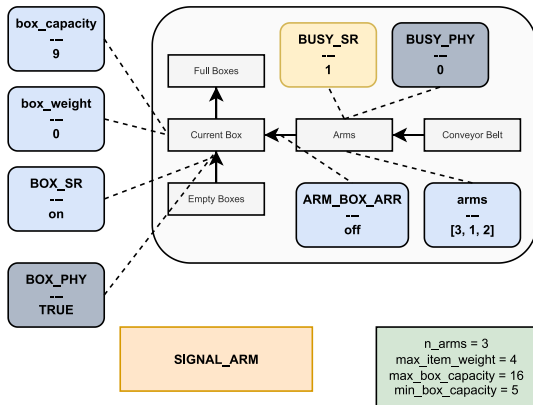
Model Checking: 2 BOX_ARR_PHY



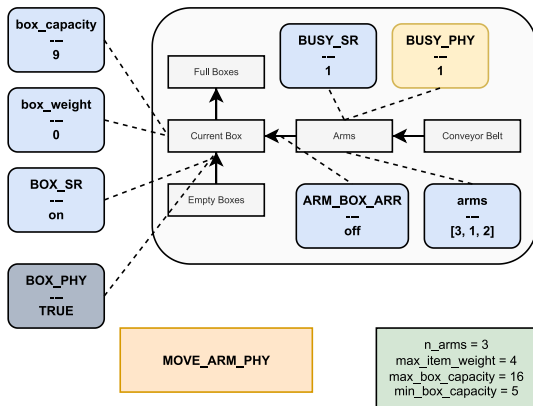
Model Checking: 3 BOX_ARR



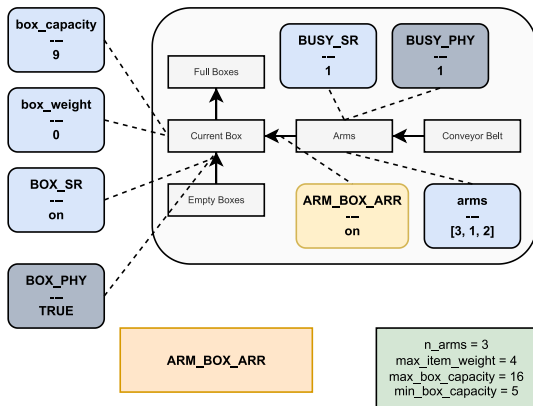
Model Checking: 4 SIGNAL_ARM



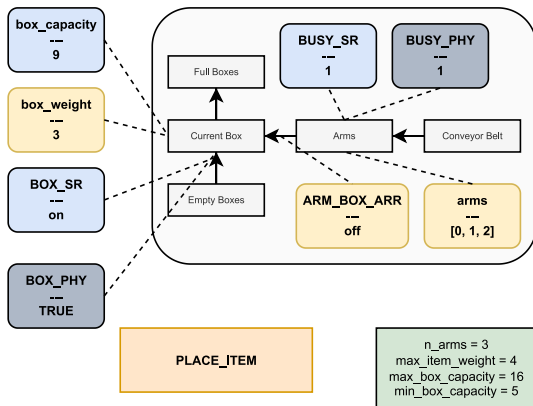
Model Checking: 5 MOVE_ARM_PHY



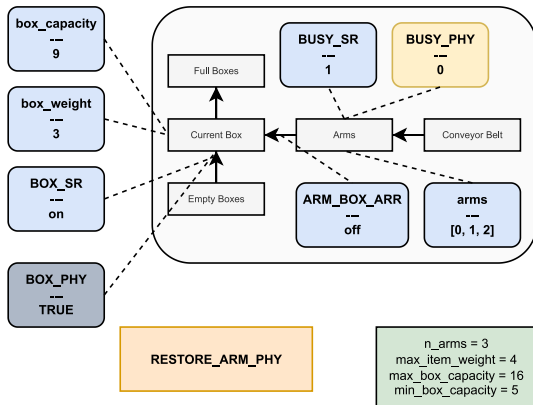
Model Checking: 6 ARM_BOX_ARR



Model Checking: 7 PLACE_ITEM



Model Checking: 8 RESTORE_ARM_PHY



Model Checking: 9 RESTORE_ARM_CTRL

