

Titolo esplicativo

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1 List of predicates

2 Specification of the system

2.1 Specification of the working cell

2.2 Specification of the robot

1. It is impossible that the local bin is empty and full at the same time.

$$\neg(\text{isLocalBinEmpty} \wedge \text{isLocalBinFull})$$

2.2.1 Specification of the arm

2.2.2 Specification of the cart

1. It is impossible that the cart is moving and is still at the same time.

$$\neg(\text{isCartMoving} \wedge \text{isCartStill})$$

2. The cart is moving or is still.

$$\text{isCartMoving} \vee \text{isCartStill}$$

3. The cart is moving if and only if it is moving at some speed.

$$\text{isCartMoving} \leftrightarrow (\text{isCartMovingSlow} \vee \text{isCartMovingMedium} \vee \text{isCartMovingFast})$$

4. It is impossible that the cart is moving at different speeds at the same time.

$$\text{isCartMovingSlow} \rightarrow (\neg \text{isCartMovingMedium} \wedge \neg \text{isCartMovingFast})$$

$$\text{isCartMovingMedium} \rightarrow (\neg \text{isCartMovingSlow} \wedge \neg \text{isCartMovingFast})$$

$$\text{isCartMovingFast} \rightarrow (\neg \text{isCartMovingMedium} \wedge \neg \text{isCartMovingSlow})$$

5. The cart is moving if and only if is moving to the bin or to the pallet.

$$\text{isCartMoving} \leftrightarrow (\text{isCartMovingToBin} \vee \text{isCartMovingToPallet})$$

6. It is impossible that the cart is moving to the bin and to the pallet at the same time.

$$\neg(\text{isCartMovingToBin} \wedge \text{isCartMovingToPallet})$$

2.3 Specification of the operator

1. The operator is trapped only if it is close to the robot.

$$\text{isOperatorTrapped} \rightarrow \text{isOperatorClose}$$

2. The operator is close to the robot or away.

$$\text{isOperatorClose} \vee \text{isOperatorAway}$$

3. The operator can't be close to the robot and away at the same time.

$$\neg(\text{isOperatorClose} \wedge \text{isOperatorAway})$$

3 Specification of the safety properties