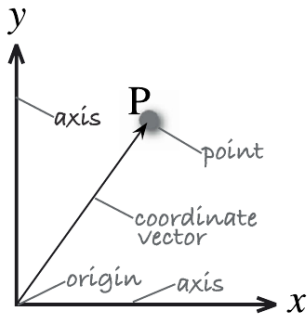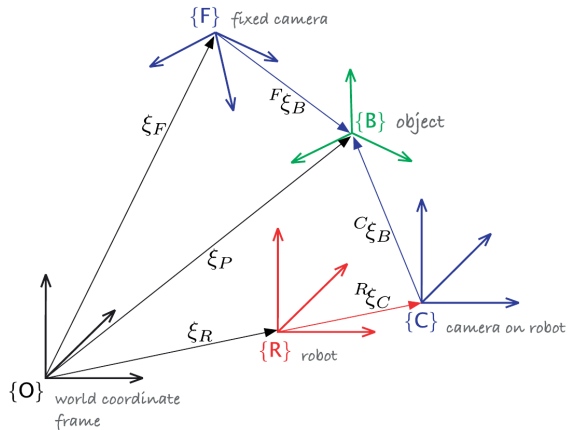# Pose en 2D

Kjartan Halvorsen

February 17, 2022

Definiciones
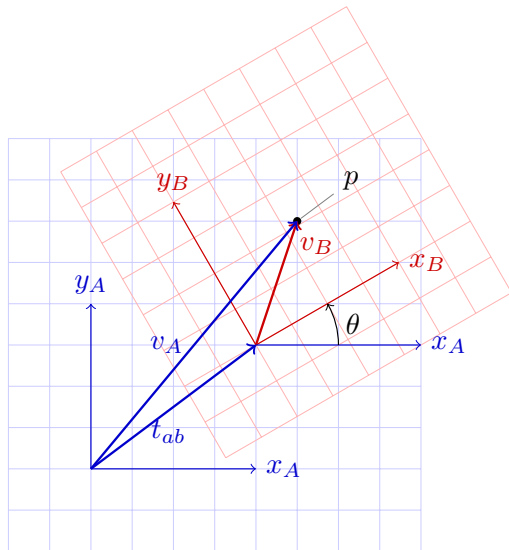

Peter Corke *Robotics, vision and control*

Uso de sistemas de referencia en robótica

Peter Corke *Robotics, vision and control*

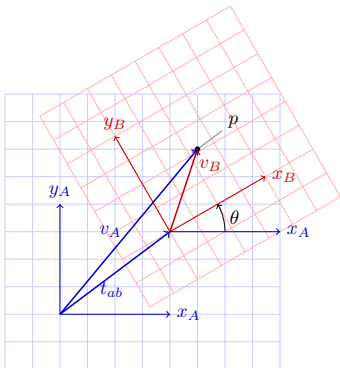# Pose en 2D

Pose en 2D

El vector $\vec{x_B}$ en sistema $\{A\}$:

$$\vec{x_B} = \cos\theta \vec{x_A} + \sin\theta \vec{y_A} = \begin{bmatrix} \vec{x_A} & \vec{y_A} \end{bmatrix} \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$

$$^A\vec{x_B} = \cos\theta {}^A\vec{x_A} + \sin\theta {}^A\vec{y_A} = \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$
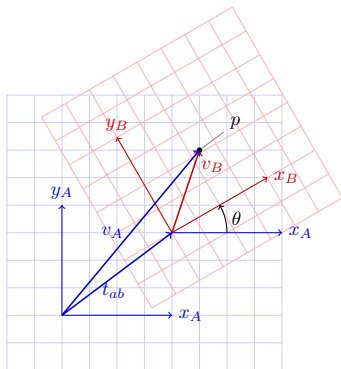
Pose en 2D

El vector $\vec{x_B}$ en sistema $\{A\}$:

$$\vec{x_B} = \cos\theta \vec{x_A} + \sin\theta \vec{y_A} = \begin{bmatrix} \vec{x_A} & \vec{y_A} \end{bmatrix} \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$

$$^A\vec{x_B} = \cos\theta\, ^A\vec{x_A} + \sin\theta\, ^A\vec{y_A} = \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$
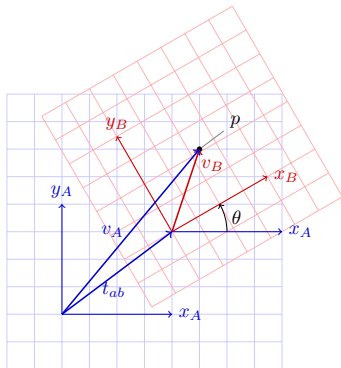
El vector $\vec{y_B}$ en sistema $\{A\}$:

$$\vec{y_B} = -\sin\theta \vec{x_A} + \cos\theta \vec{y_A} = \begin{bmatrix} \vec{x_A} & \vec{y_A} \end{bmatrix} \begin{bmatrix} -\sin\theta \\ \cos\theta \end{bmatrix}$$

$$^A\vec{y_B} = -\sin\theta\, ^A\vec{x_A} + \cos\theta\, ^A\vec{y_A} = \begin{bmatrix} -\sin\theta \\ \cos\theta \end{bmatrix}$$

Pose en 2D

El vector $\vec{x_B}$ en sistema $\{A\}$:

$$\vec{x_B} = \cos\theta\,\vec{x_A} + \sin\theta\,\vec{y_A} = \begin{bmatrix} \vec{x_A} & \vec{y_A} \end{bmatrix}\begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$

$$^A\vec{x_B} = \cos\theta\,^A\vec{x_A} + \sin\theta\,^A\vec{y_A} = \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$

El vector $\vec{y_B}$ en sistema $\{A\}$:

$$\vec{y_B} = -\sin\theta\,\vec{x_A} + \cos\theta\,\vec{y_A} = \begin{bmatrix} \vec{x_A} & \vec{y_A} \end{bmatrix}\begin{bmatrix} -\sin\theta \\ \cos\theta \end{bmatrix}$$

$$^A\vec{y_B} = -\sin\theta\,^A\vec{x_A} + \cos\theta\,^A\vec{y_A} = \begin{bmatrix} -\sin\theta \\ \cos\theta \end{bmatrix}$$

El punto P en sistema $\{A\}$: $p_A = O_A + v_A$, donde:

$$\vec{v}_A = \vec{t}_{ab} + \vec{v}_B = \vec{t}_{ab} + {}^B p_x\,\vec{x_B} + {}^B p_y\,\vec{y_B}$$

Pose en 2D

El vector $\vec{x_B}$ en sistema $\{A\}$:

$$\vec{x_B} = \cos\theta \vec{x_A} + \sin\theta \vec{y_A} = \begin{bmatrix} \vec{x_A} & \vec{y_A} \end{bmatrix} \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$

$$^A\vec{x_B} = \cos\theta {}^A\vec{x_A} + \sin\theta {}^A\vec{y_A} = \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$
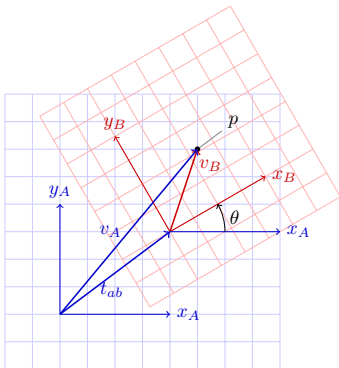
El vector $\vec{y_B}$ en sistema $\{A\}$:

$$\vec{y_B} = -\sin\theta \vec{x_A} + \cos\theta \vec{y_A} = \begin{bmatrix} \vec{x_A} & \vec{y_A} \end{bmatrix} \begin{bmatrix} -\sin\theta \\ \cos\theta \end{bmatrix}$$

$$^A\vec{y_B} = -\sin\theta {}^A\vec{x_A} + \cos\theta {}^A\vec{y_A} = \begin{bmatrix} -\sin\theta \\ \cos\theta \end{bmatrix}$$

El punto P en sistema $\{A\}$: $p_A = O_A + v_A$, donde:

$$\vec{v_A} = \vec{t_{ab}} + \vec{v_B} = \vec{t_{ab}} + {}^B p_x \vec{x_B} + {}^B p_y \vec{y_B}$$

$$^A\vec{v_A} = {}^A\vec{t_{ab}} + {}^B p_x {}^A\vec{x_B} + {}^B p_y {}^A\vec{y_B} = {}^A\vec{t_{ab}} + \begin{bmatrix} ^A\vec{x_B} & ^A\vec{y_B} \end{bmatrix} \begin{bmatrix} ^B p_x \\ ^B p_y \end{bmatrix}$$

Pose en 2D

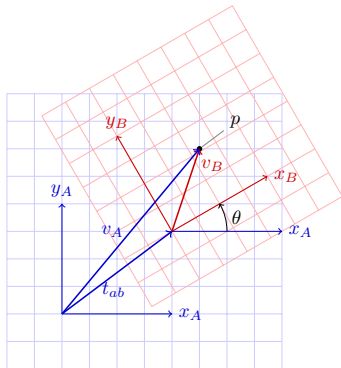El punto P en sistema $\{A\}$: $p_A = O_A + v_A$, donde:

$$\vec{v}_A = \vec{t}_{ab} + \vec{v}_B = \vec{t}_{ab} + {}^B p_x \vec{x_B} + {}^B p_y \vec{y_B}$$

$${}^A \vec{v_A} = {}^A \vec{t}_{ab} + {}^B p_x {}^A \vec{x_B} + {}^B p_y {}^A \vec{y_B} = {}^A \vec{t}_{ab} + \begin{bmatrix} {}^A \vec{x_B} & {}^A \vec{y_B} \end{bmatrix} \begin{bmatrix} {}^B p_x \\ {}^B p_y \end{bmatrix}$$
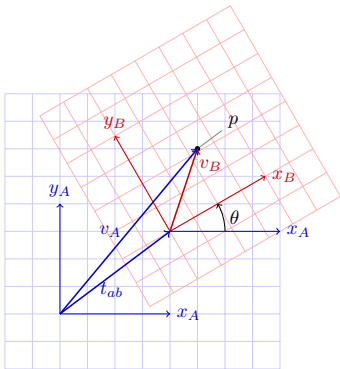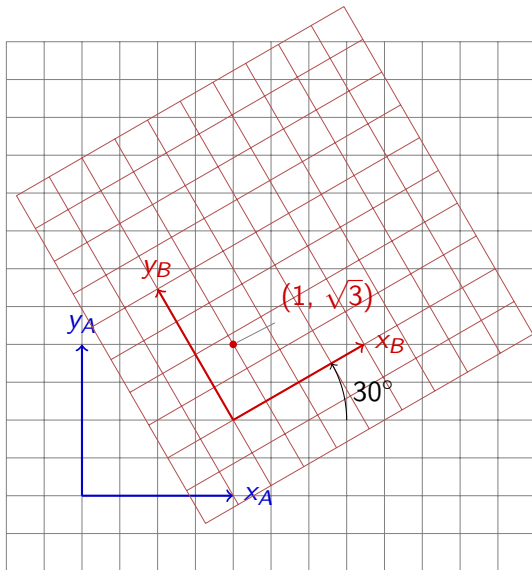
Pose en 2D

El punto P en sistema $\{A\}$: $p_A = O_A + v_A$, donde:

$$\vec{v}_A = \vec{t}_{ab} + \vec{v}_B = \vec{t}_{ab} + {}^B p_x \vec{x_B} + {}^B p_y \vec{y_B}$$

$${}^A\vec{v_A} = {}^A\vec{t}_{ab} + {}^B p_x {}^A\vec{x_B} + {}^B p_y {}^A\vec{y_B} = {}^A\vec{t}_{ab} + \begin{bmatrix} {}^A\vec{x_B} & {}^A\vec{y_B} \end{bmatrix} \begin{bmatrix} {}^B p_x \\ {}^B p_y \end{bmatrix}$$

$$= {}^A\vec{t}_{ab} + \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} {}^B p_x \\ {}^B p_y \end{bmatrix}$$
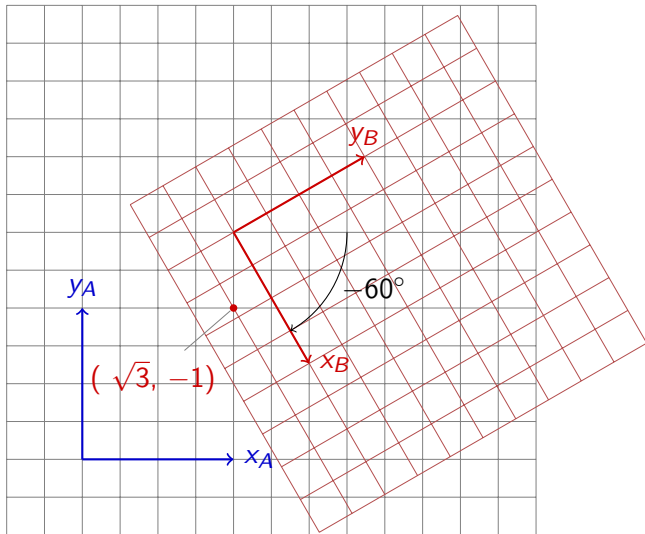
Ejemplo

Determine la matriz de rotación R_{ab} y la translación t_{ab} que definen la transformación entre $\{B\}$ y $\{A\}$. Verifique que

$$^A p = \begin{bmatrix} 4 \\ 4 \end{bmatrix} = R_{ab}^B p + t_{ab}$$

$$= R_{ab} \begin{bmatrix} 1 \\ \sqrt{3} \end{bmatrix} + t_{ab}$$

Ejercicio

Determine la matriz de rotación R_{ab} y la translación t_{ab} que definen la transformación entre $\{B\}$ y $\{A\}$. Verifique que

$$^A p = \begin{bmatrix} 4 \\ 4 \end{bmatrix} = R_{ab}^B p + t_{ab}$$

$$= R_{ab} \begin{bmatrix} \sqrt{3} \\ -1 \end{bmatrix} + t_{ab}$$

Programar