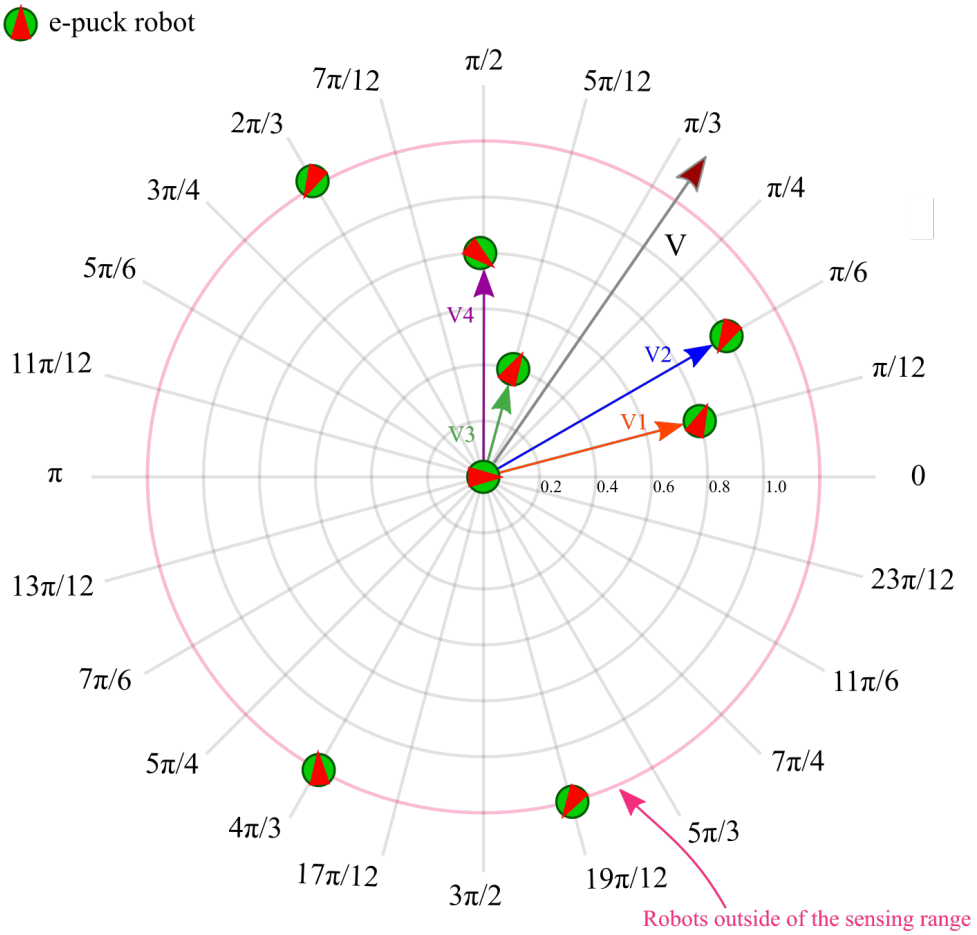
Position Vector of Attraction Low-Level-Behavior

In attraction low-level-behavior, the e-puck robot uses the range-&-bearing to follow the direction towards the center of mass of the neighboring peers. The robot receives the heartbeat signals of the peers that are in its perception range and has therefore knowledge of their number (n), and of their aggregate relative position (V) which is defined as:

$$V = \begin{cases} \sum_{m=1}^{n} \left(\frac{1}{1+r_m}, \angle b_m \right), & \text{if robots are perceived;} \\ (1, \angle 0), & \text{otherwise.} \end{cases} \tag{1}$$

Here, r_m and b_m are the range and bearing of the m^{th} neighboring peer, respectively. The position vector converges towards the nearest robots due to the factor $\frac{1}{1+r_m}$. The extreme values of V are $([0.5, 30], [0, 2\pi])$. Eventually, the control software actuates the wheels of the robot by setting the right and left wheel velocity and the robot follows the vector V.

We present here two scenarios to determine the aggregate position vector V. In both scenarios, there are four neighboring peers in perception range of an e-puck robot. The positions of the neighboring peers are different in both scenarios. Their relative position vectors are $V1, V2, V3, and\ V4$. The aggregate position vector V is determined by adding all vectors as shown in Fig. 1 and Fig. 2.



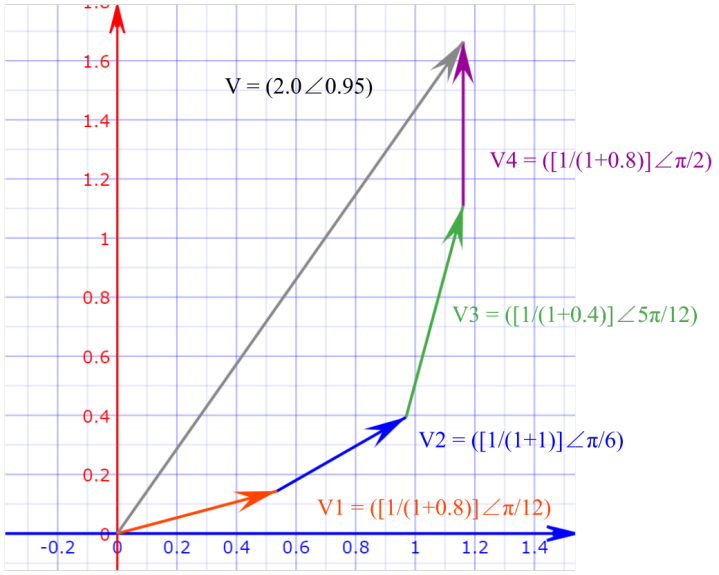


Figure 1: Scenario-1

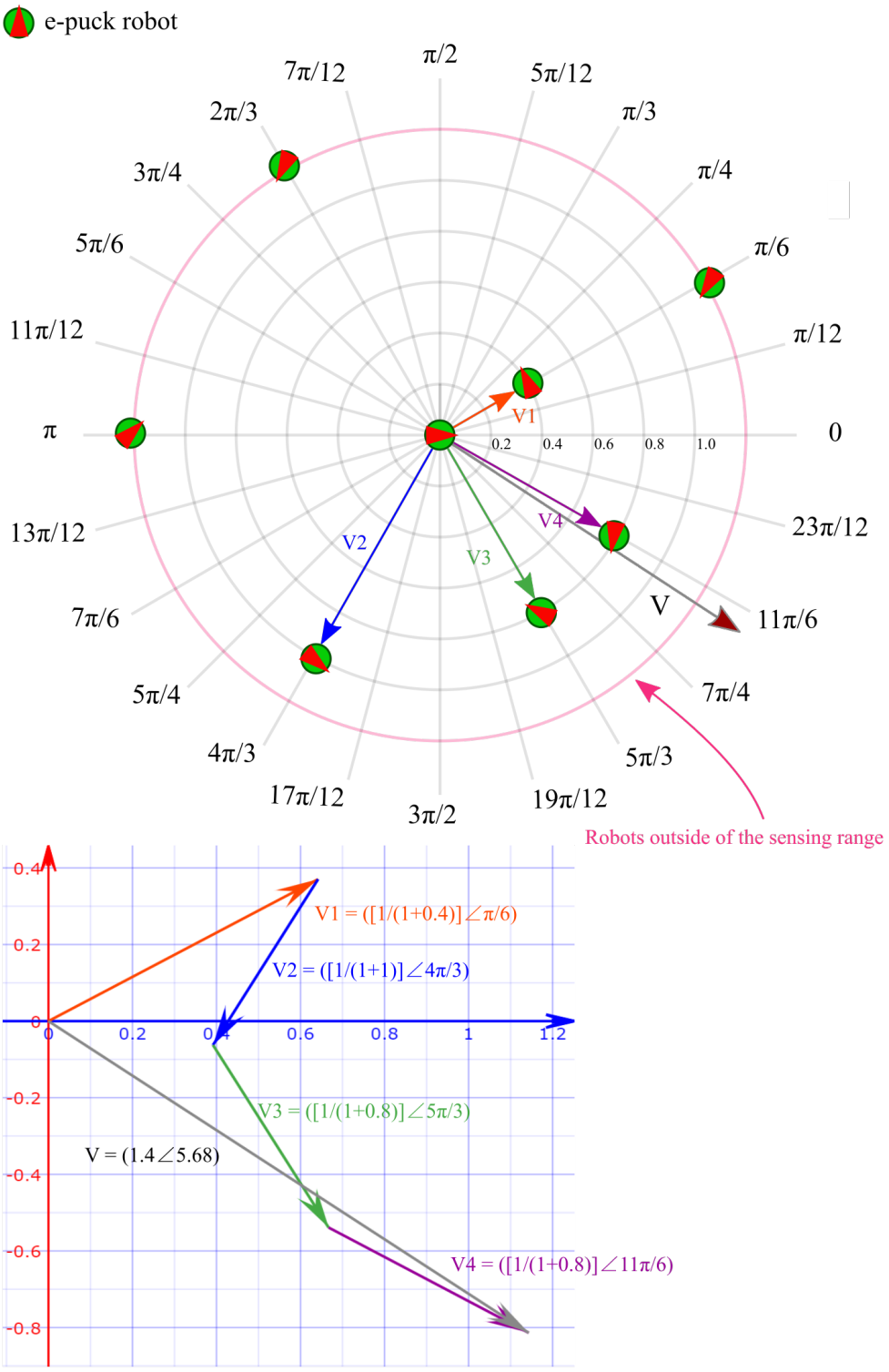


Figure 2: Scenario-2