Introduction to Robotics

Manipulation and Programming

Unit 1: Introduction

SENSOR/CONTROL UNIT USING ARDUINO AND C LANGUAGE

DR. ERIC CHOU IEEE SENIOR MEMBER

Objective

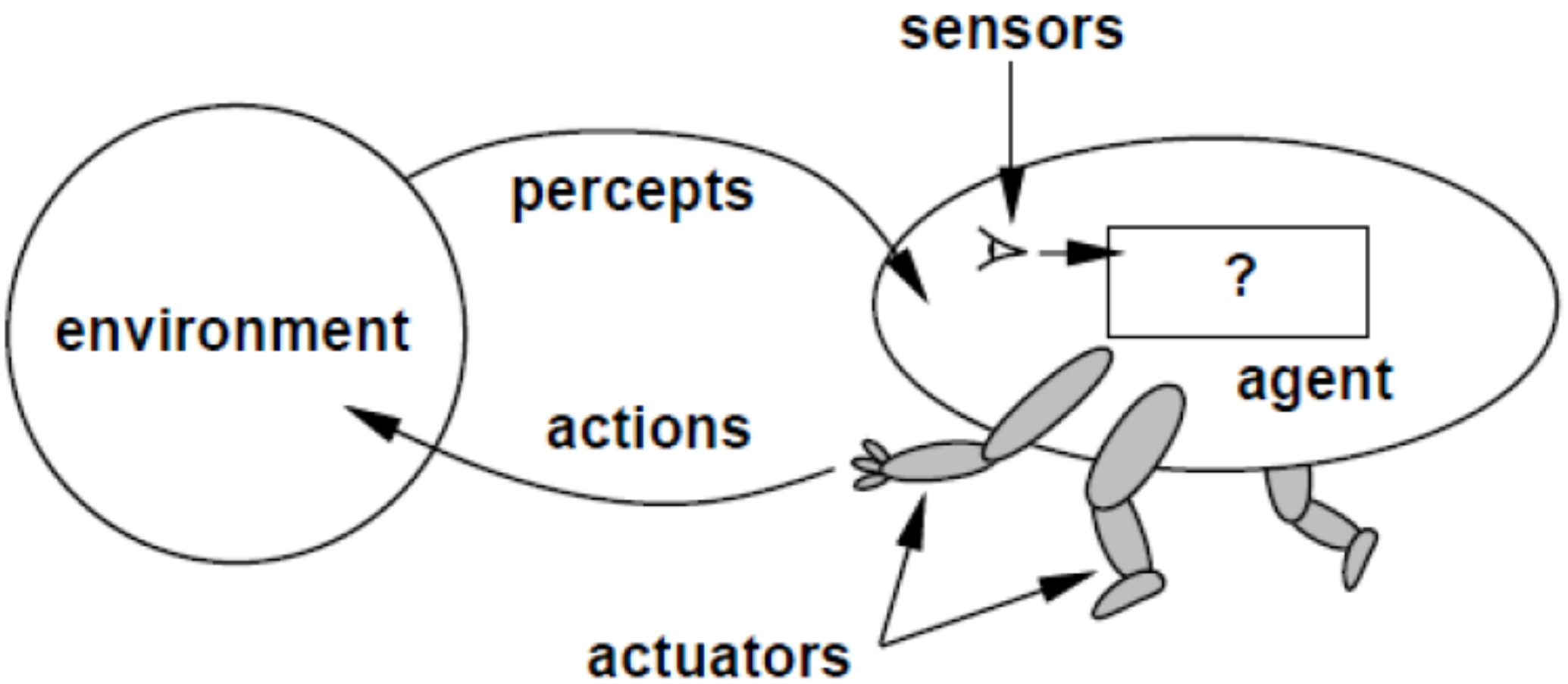
- Understand the control unit and the sensor unit and their use in a robot system.
- Installation of the Arduino software system. And upload the first program onto the Arduino processor.
- Understand the different control modes
- Understand the firmware development cycle

Robotics Development System

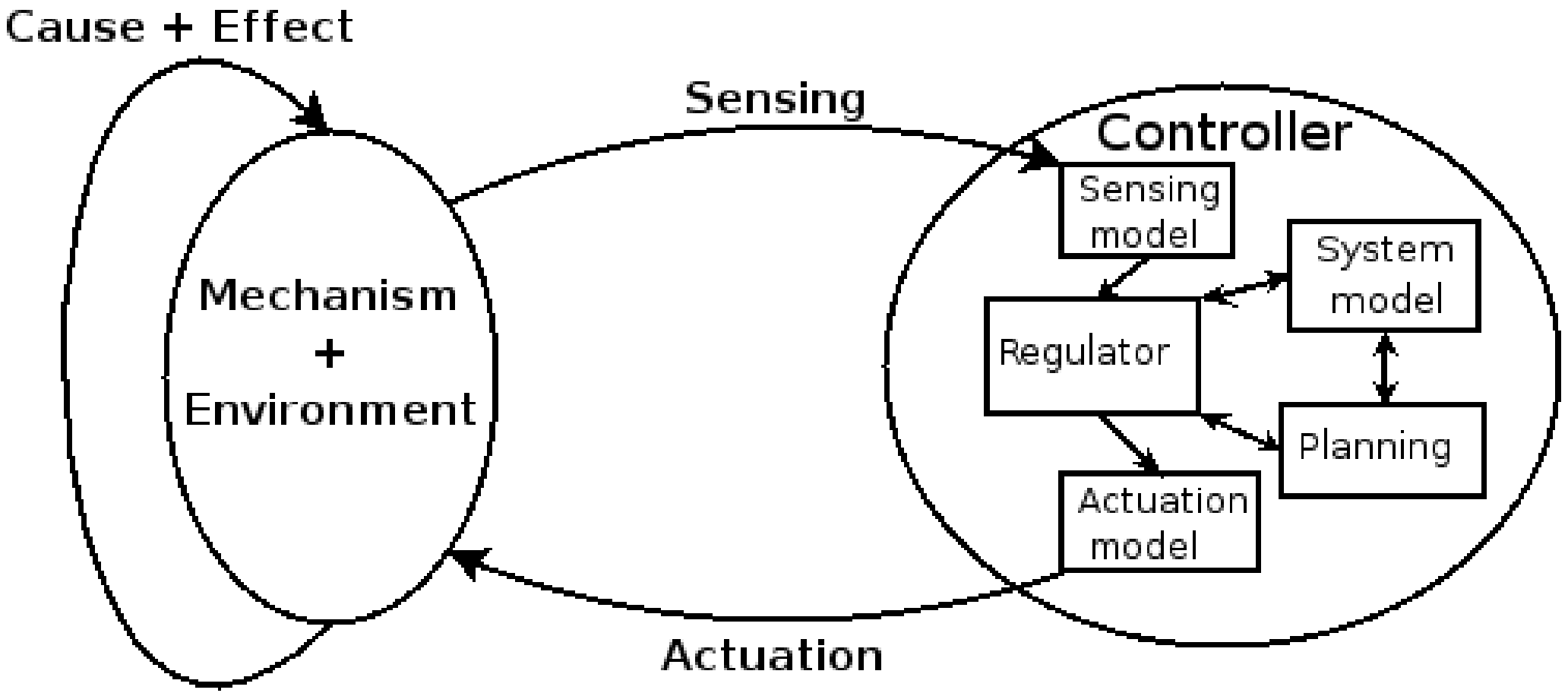
SECTION 1

Overview

- We use XARM and Arduino system as our robotics prototype system. It is not intended as a product development system. It is designed as a fast prototype system.
- In this prototype system, we may experiment the following thing:
  1. Apply robotics control algorithm to it.
  2. Design the feedback system.
  3. Develop as a prototype system.

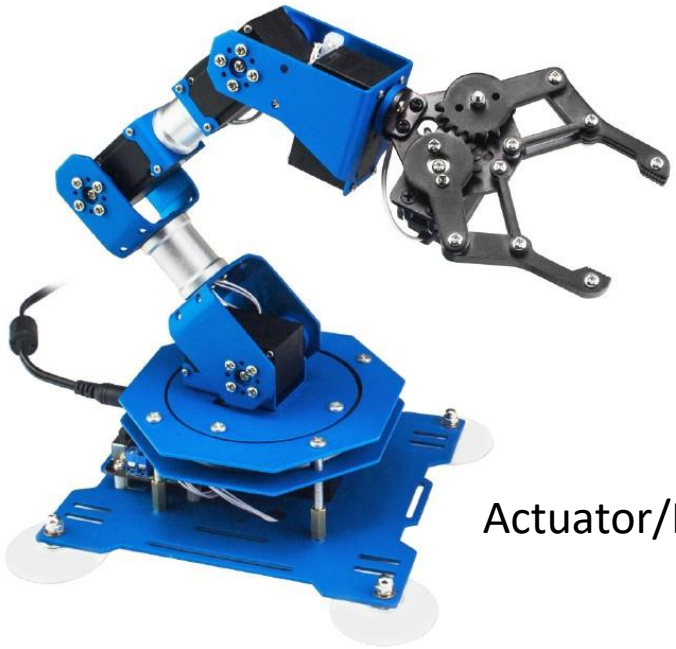


Conceptual Robot System



Logical Robot System

Sensor and Development Kits



Actuator/Manipulator

Controller Arduino AT Mega 2560

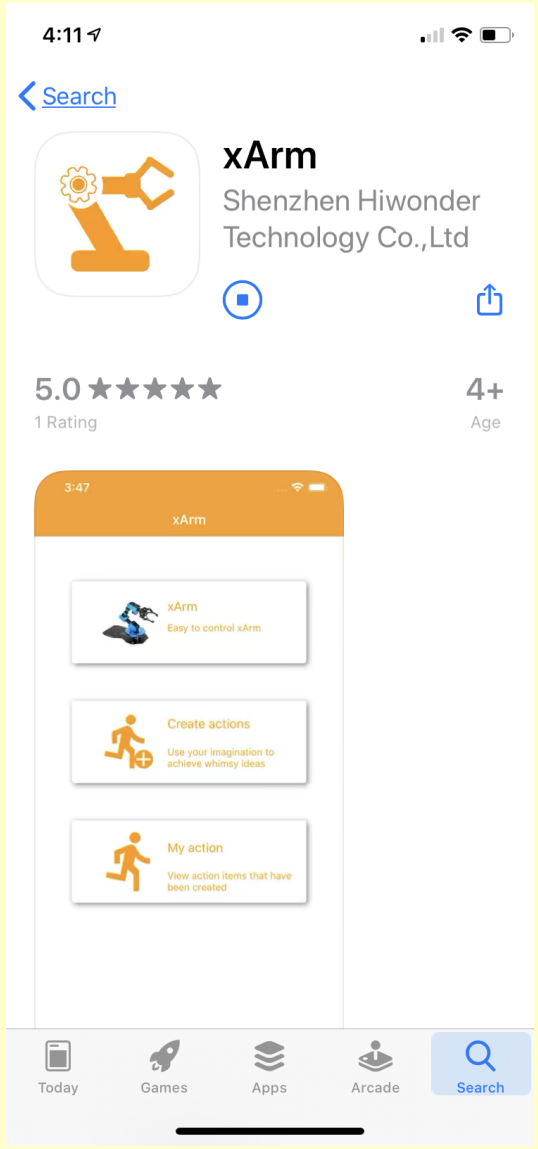
Our Prototype Robot System

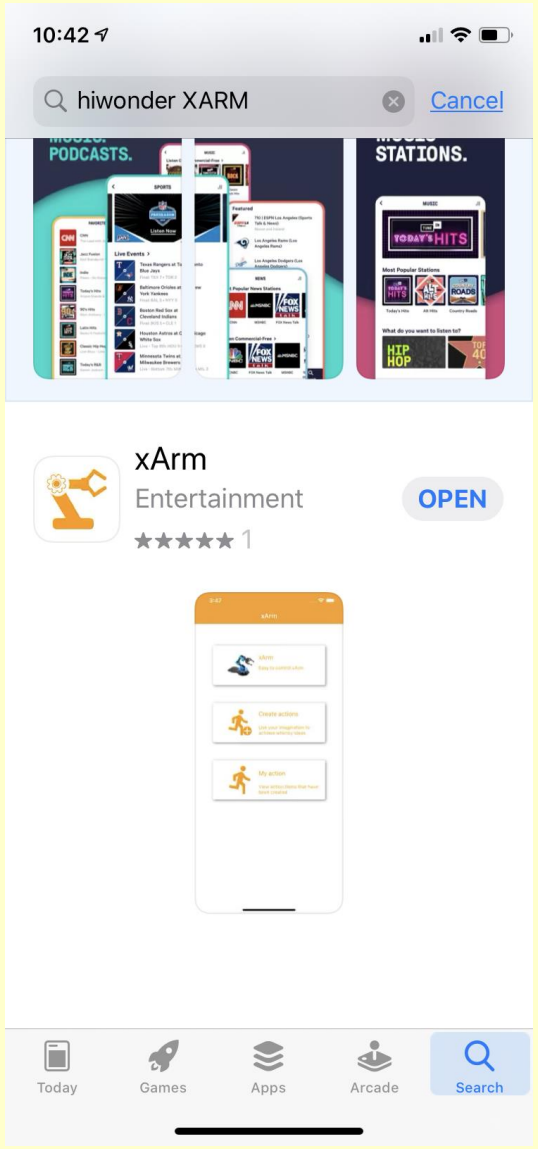
Installation of the Arduino Software

SECTION 3

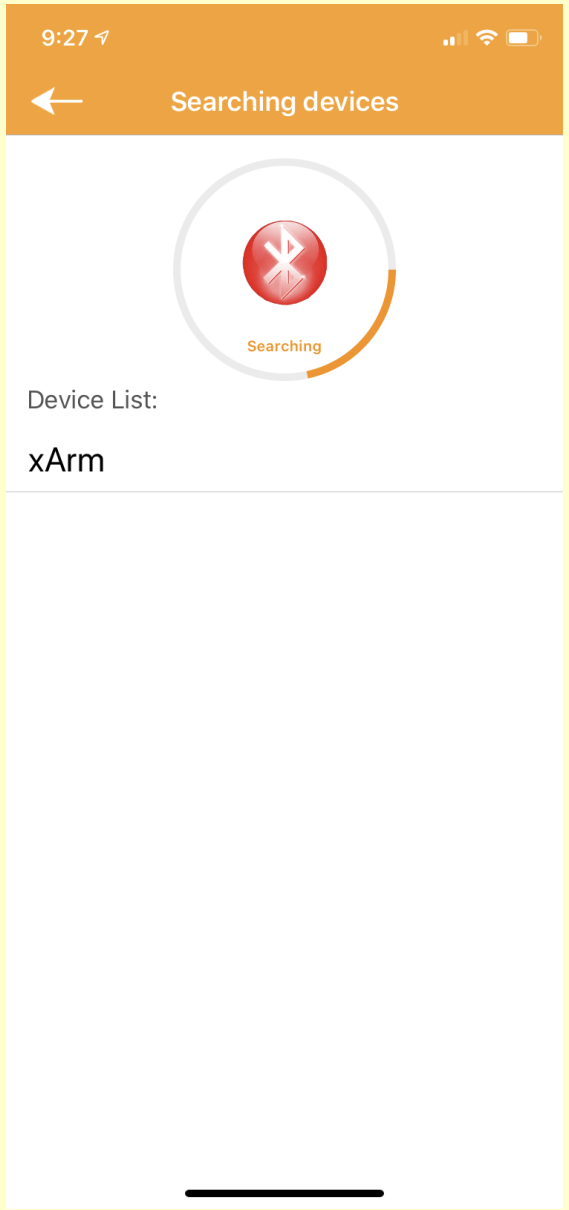
Installation of the XARM App

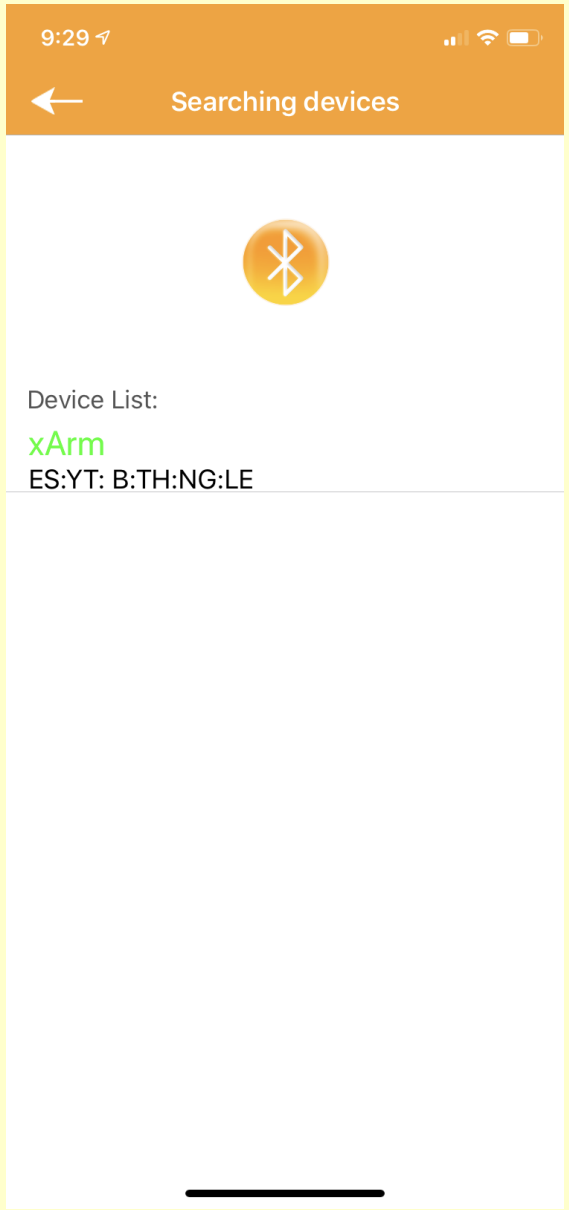
SECTION 4

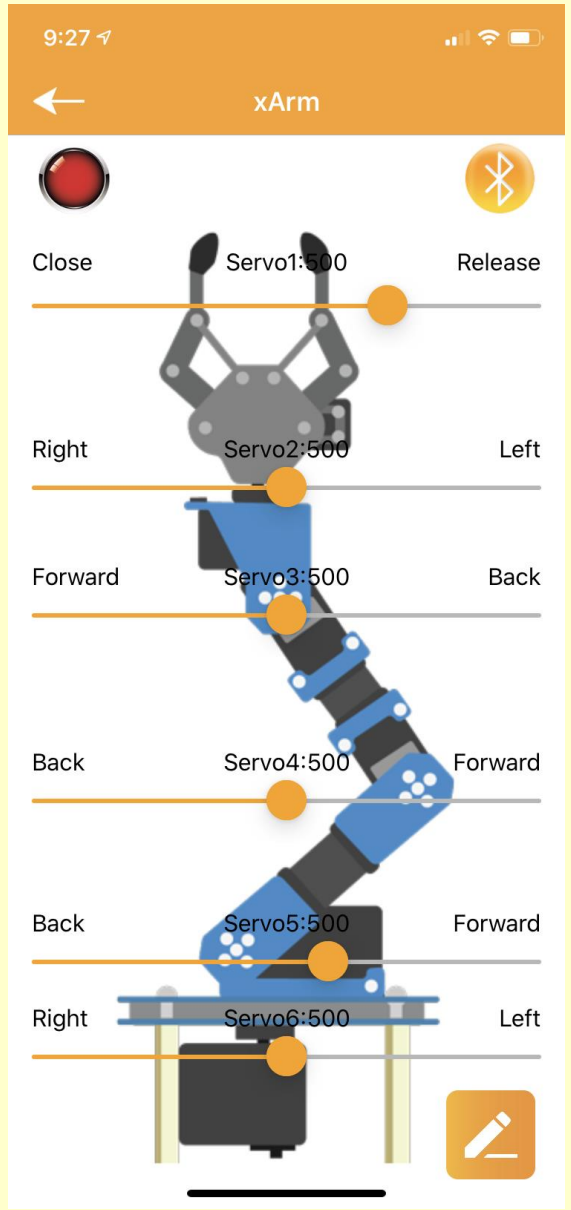

4:11
Search
xArm
Shenzhen Hiwonder Technology Co.,Ltd
5.0
1 Rating
4+
Age
3:47
xArm
xArm
Easy to control xArm
Create actions
Use your imagination to achieve whimsy ideas
My action
View action items that have been created
Today
Games
Apps
Arcade
Search


10:42
hiwonder XARM
Cancel
PODCASTS.
STATIONS.
xArm
Entertainment
OPEN
1
Today
Games
Apps
Arcade
Search


4:11
App Store
xArm
xArm
Easy to control xArm
Create actions
Use your imagination to achieve whimsy ideas
My action
View action items that have been created


9:27
Searching devices
Searching
Device List:
xArm


9:29
Searching devices
Device List:
xArm
ES:YT: B:TH:NG:LE


9:27
xArm
Close
Servo1:500
Release
Right
Servo2:500
Left
Forward
Servo3:500
Back
Back
Servo4:500
Forward
Back
Servo5:500
Forward
Right
Servo6:500
Left

Installation of the XARM PC Software

SECTION 5

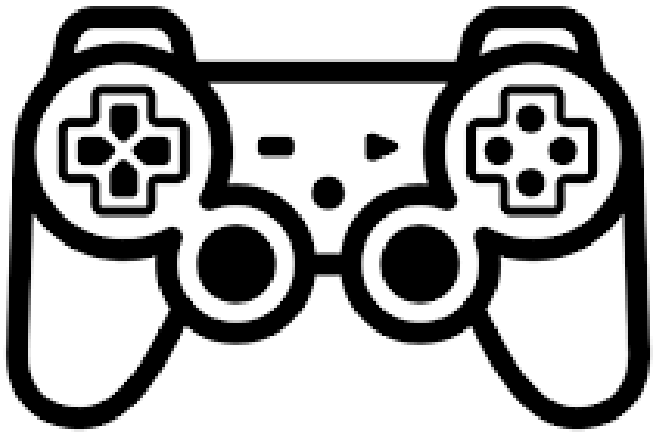
Installation of the XARM Secondary Development Kit (WeMake)

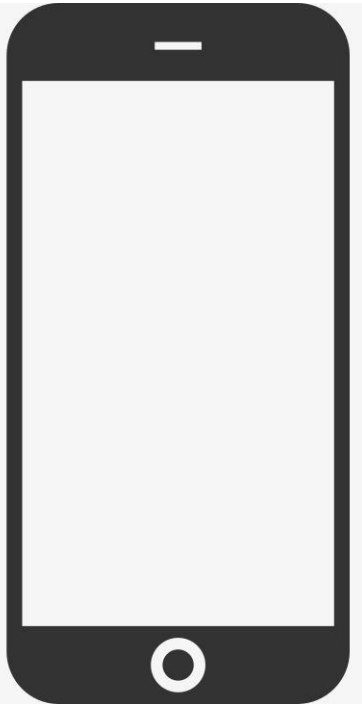
SECTION 6

xArm Operating Modes

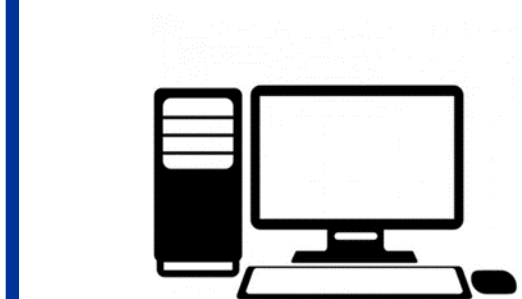
SECTION 7

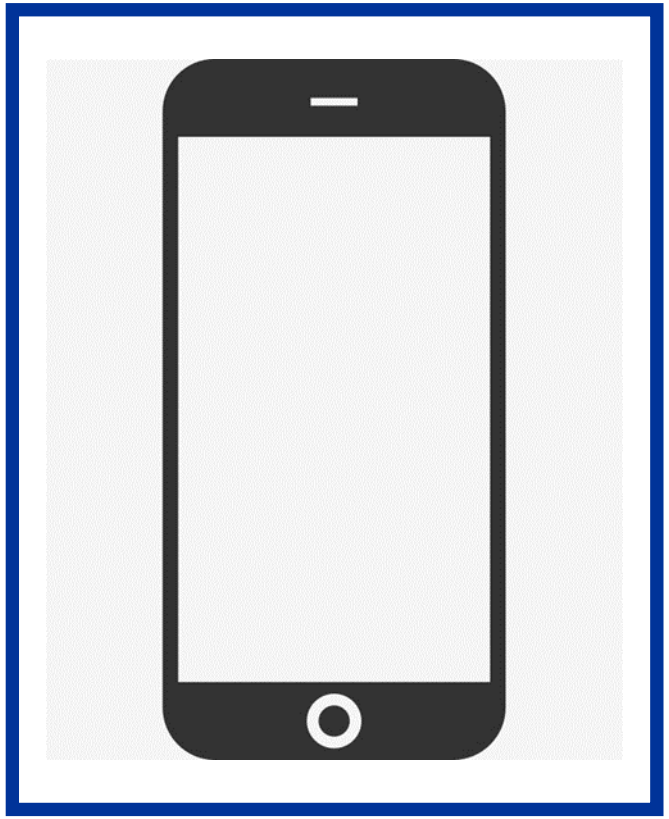
Manipulation



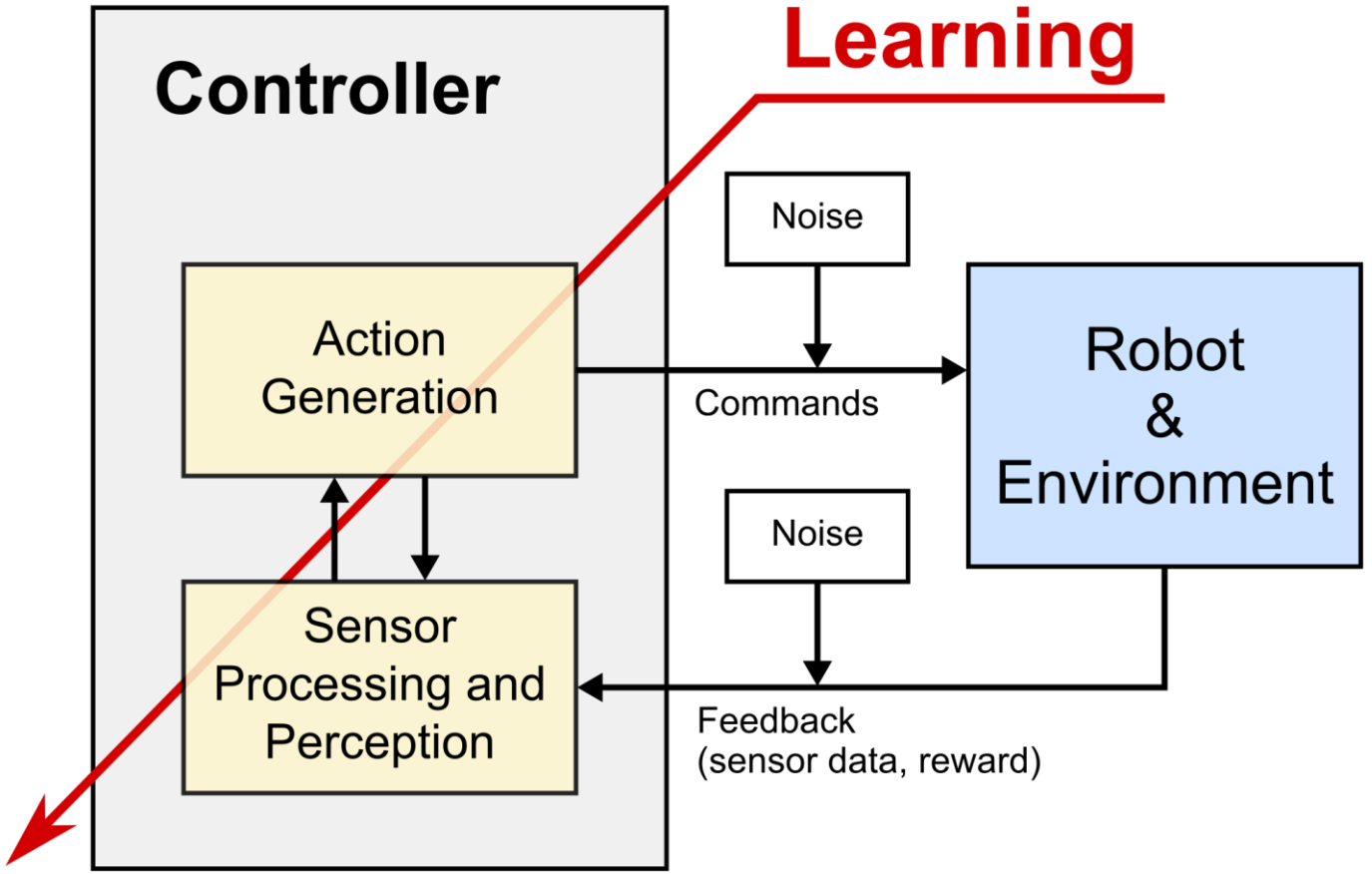


Action Group xArm Program Control





Smart Arm


Learning
Controller
Noise
Action Generation
Commands
Robot & Environment
Noise
Sensor Processing and Perception
Feedback
(sensor data, reward)

Summary

SECTION 8

Summary

- In this lecture, the manipulation modes, the programming modes, and the Arduino programming environment are presented
- Many labs will be developed with this software and hardware setting. They will be included in this course but in other lectures.