Lesson Planning Template **Teacher: DeSIRE**

📆Date:	Topic: PC Software Instruction	Time Required: 45 minutes

🎯**Learning Target/Objectives:**

- I can install the required software to run the xArm robot.
- I can control the functions of the xArm robot.

📜**Vocabulary:**

Color Legend:
Red = Essential
Blue = Enrichment
Purple = In Depth

❓**Guiding Questions:**

- What are some real-world robots that are similar in design and function to the xArm?
- How are these analogous robots used?

📚**Lesson Design Details:**
Activity 1: Students will download the appropriate software to run the xArm robot and test its functionality.

Key Points:
Based on the **Lesson 1 PC Software Instruction** manual for the Hiwonder xArm, students will need to master a combination of technical, mathematical, and computer science terms to successfully install and operate the robotic system.

Computer Science & Software Vocabulary

- **Installation Pack:** The compressed file or folder containing the necessary data and executable files to set up the xArm software on a PC
- **Desktop Shortcut:** An icon created on the computer's main screen that allows for quick access to the xArm application
- **USB Serial Port:** The specific hardware interface on the computer used to communicate data between the PC and the robotic arm's controller
- **Micro-USB:** The type of cable required to connect the robotic arm controller to the computer
- **Device Connection:** The process of establishing a successful data "handshake" between the software and the hardware, indicated by a status icon turning from red to green

Technology & Robotics Vocabulary

- **Servo:** A specialized motor used in robotics that allows for precise control of angular or linear position
- **Transducer/Controller:** The "brain" of the robotic arm that receives signals from the computer and converts them into physical movement
- **Action Group:** A programmed sequence of movements that can be saved, downloaded, and run repeatedly
- **Manual Coding:** A mode that allows the user to manually change the stance or "pose" of the robotic arm by loosening its joints and then reading the resulting angle data

- **Read Angle:** A function where the software retrieves the current position data from the physical robotic arm

Mathematics & Data Vocabulary

- **ID Value:** A unique numerical identifier assigned to each specific servo (e.g., ID:1 through ID:6) to ensure the software controls the correct motor
- **Deviation:** The numerical difference or "offset" used to calibrate a servo's position, ranging from -100 to 100
- **Millisecond (ms):** The unit of time measurement used in the "Action details list" to define the duration of a specific movement
- **Parameter Range:** The numerical limits for servo adjustment, which in this software is defined from 0 to 1000

📝**Materials/Resources:**

- Digital Journal (Google Slides RECOMMENDED):

📋**Closing (Check for Understanding):**

- Discussion Review - students will share
  - Answers to Guiding Questions
  - Any surprises they experienced

Category	Standard Organization	Standard/Benchmark Code & Description
Computer Science	NCSCOS (K-12 CS)	**68-CS-02:** Design projects that combine hardware and software components to collect and exchange data (e.g., connecting xArm to PC).
	ISTE (Students)	**1.1.d:** Students understand fundamental concepts of technology operations and demonstrate the ability to choose, use, and troubleshoot technologies.
	NCSCOS (K-12 CS)	**35-DA-02:** Illustrate the process of file management and version control (e.g., opening and saving action files to the computer).
Computer Science	ISTE (Students)	**1.5.d:** Understand how automation works and use algorithmic thinking to develop a sequence of steps to create automated solutions.

Mathematics	**NCSCOS (Math)**	**NC.M1.F-IF.4:** Interpret key features of tables in terms of quantities (e.g., analyzing the "Action details list" showing time in ms and servo data).
	NCSCOS (Math)	**NC.6.NS.6:** Understand rational numbers as points on a number line (e.g., adjusting servo positions from 0 to 1000).
Science	**NCSCOS (Science)**	**PSc.1.2.3:** Explain the relationship among work, power, and efficiency (e.g., controlling robotic arm motion through servo intensity/amplitude).
Technology	**ITEEA (STEL)**	**STEL-8M:** Use specialized software and hardware to access, organize, and communicate key ideas, such as programming an action group.
	ITEEA (STEL)	**STEL-1B:** Explain the tools and techniques that people use to help them do things, such as using specialized software to control robotic joints.