



 <b>Date:</b>		<b>Topic: Smart Phone Control</b>	<b>Time Required: 45 minutes</b>
 <b>Learning Target/Objectives:</b> <ul style="list-style-type: none"> <li>• <b>I can</b> configure a mobile application to establish a secure Bluetooth and GPS-linked connection with robotic hardware .</li> <li>• <b>I can</b> manipulate a three-dimensional robotic arm using a two-dimensional interface and touch-drag gestures .</li> <li>• <b>I can</b> distinguish between remote control, creation, and storage modes within a mobile robotics ecosystem</li> </ul>			
 <b>Vocabulary:</b> <ul style="list-style-type: none"> <li>• Bluetooth Pairing</li> <li>• GPS Service</li> <li>• Model Remote Control</li> <li>• Create Actions</li> <li>• 2D Animation</li> <li>• Custom Actions</li> </ul>		 <b>Guiding Questions:</b> <ul style="list-style-type: none"> <li>• Why does the application require both Bluetooth and GPS services to be active before it can find the robotic arm?</li> <li>• How does dragging the 2D animation on the screen translate into precise physical movements of the robot's servos ?</li> <li>• What are the practical advantages of "Create Actions" mode for industrial or medical robots compared to simple manual remote control?</li> </ul>	
 <b>Lesson Design Details:</b> <ul style="list-style-type: none"> <li>• <b>Activity 1: The Connection Checklist</b> <ul style="list-style-type: none"> <li>○ <b>Focus:</b> Students act as "Technical Support" and create a visual flowchart for pairing the device, highlighting the "Settings" menu fix if the wrong robot model appears.</li> </ul> </li> <li>• <b>Activity 2: The Digital Twin Challenge</b> <ul style="list-style-type: none"> <li>○ <b>Focus:</b> Using "Model Remote Control," students must move the physical arm into a specific pose by only touching the 2D animation on the screen. They then compare the digital stance to the physical stance .</li> </ul> </li> <li>• <b>Activity 3: Action Group Execution</b> <ul style="list-style-type: none"> <li>○ <b>Focus:</b> Students trigger pre-downloaded action groups and identify which button executes which complex move.</li> </ul> </li> </ul>			

### Key Points (Vocabulary):

- **Bluetooth Pairing:** The process of connecting the smartphone and robot wirelessly through the app's internal search function.
- **GPS Service:** Global Positioning System; required by some mobile operating systems to enable Bluetooth device discovery.
- **Model Remote Control:** An interface mode that combines a 2D screen with buttons to control movement.
- **Create Actions:** A programming mode used to debug, record, and save robotic data.
- **2D Animation:** A digital representation on the screen that mirrors the physical stance of the xArm 1S .
- **Custom Actions:** User-programmed movements stored in the "My Action" folder.

### Key Points of Instruction

- **In-App Pairing Only:** Students often try to pair Bluetooth in their phone's main settings menu. Emphasize that they **must** use the flashing Bluetooth icon inside the Wonderbot app to avoid connection errors .
- **Platform Requirements:** Ensure students check their OS version. The app requires Android 7.0 or above, or iOS 9.0 or above.
- **Spatial Mapping:** Instruct students on how the 2D animation works. Dragging specific sections of the digital arm controls specific servos (ID3, ID4, or ID5), while sliders control others (ID1, ID2, and ID6) .
- **Safety Reset:** Teach the "Back to Start" command immediately. This is the primary way to return all servos to their safe, middle position if the robot becomes tangled or unstable.

### Teacher's Cheat Sheet

Feature	Requirement / Action
App Name	Wonderbot (App Store for iOS)
OS Requirements	Android 7.0 or above / iOS 9.0 or above
Crucial Pre-step	Turn on Bluetooth AND GPS before opening App
Pairing Protocol	Click flashing Bluetooth icon in App; select "xArm"

<b>Model Selection</b>	If interface is wrong, go to Settings -> choose "xArm"
<b>Reset Command</b>	Click "Back to Start" for middle position
<b>Manual Controls</b>	Drag digital arm (ID3-5) or use left-side buttons (ID1, 2, 6)
<b>Switch Sequence</b>	SELECT (Hold) then START
<b>Reset/Initial Stance</b>	Press "START" once in Action Group Mode

<b>Category</b>	<b>Standard Organization</b>	<b>Standard/Benchmark Code and Description</b>
Technology	ITEEA	STEL-2R: Follow step-by-step instructions to safely use systems and troubleshoot common problems.
Computer Science	NCSOS	HS-CS-02: Design and implement strategies for troubleshooting hardware and software problems.
Engineering	ITEEA	STEL-3H: Optimize a system by identifying and managing various constraints.
Digital Literacy	ISTE	1.1 Empowered Learner: Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals.
Computer Science	NCSOS	HS-AP-12: Use and adapt classic algorithms to solve computational problems.