

MAESER KIDS ROBOTICS CAMP

Complete Day-by-Day Timeline

10 Days · 3 Hours/Day · Up to 18 Kids (Ages 8–12) · 6 Teams

CAMP-WIDE SETUP

- Platform: Arduino Uno + LEGO-compatible chassis kits, coded with PictoBlox block coding
- Days 1–3: individual builds — every kid works their own circuit/board
- Days 4–10: team-based (6 teams) — one shared car per team; hands-on role rotates day to day so every kid gets each day's lesson, not fixed builder/wirer/coder roles
- Motor driver + base wiring pre-done by instructors before each relevant day
- Batteries: 6 AA per car × 6 teams = 36 batteries needed, plus spares (holders already owned)
- Every day includes a 10–15 minute snack/break roughly halfway through the 3-hour session
- No dedicated cleanup buffer most days — extra transition time is only built in on Day 4 (build day) and before the Day 10 showcase

DAY 1

Electronics Fundamentals

LEDs, resistors, buttons, potentiometers, and DC motors

MATERIALS NEEDED TODAY

- Presentation slides/photos of real-world robots, then simple robots
- 1 working demo robot car to show at the start
- Breadboards, LEDs, resistors, push buttons, potentiometers, cheap basic DC motors, AA batteries + holders (1 set per kid)
- Pre-built “broken circuits” — one per kid, rotating through 4–5 fault types: reversed LED, wrong/missing resistor, loose wire, dead battery, wrong breadboard row

Time	Segment	What Happens
0:00–0:15	Welcome & Intro	Short presentation on what robotics is. Start with real-world robots (Boston Dynamics, Mars rovers, factory arms) to show kids the scale/importance of the field, then shift to simpler robots that connect directly to what they'll build this camp.
0:15–0:20	The Reveal	Show a working robot car doing something (driving, maybe a simple trick). Tell them: “This is what you're going to build.”
0:20–0:25	Grouping	Arrange kids into their working groups for today.
0:25–0:40	Teach: Electricity Basics	Explain how electricity and a battery work. Explain the basics of how a resistor and an LED work — keep it visual and simple (water-through-a-pipe analogy works well for resistance).
0:40–0:55	Activity 1	Wire up an LED with a resistor and a battery. Every kid builds their own.
0:55–1:05	Teach: Buttons	Demonstrate how a button works (completes/breaks a circuit). Show visual diagram
1:05–1:20	Activity 2	Wire an LED with a button.

Time	Segment	What Happens
1:20–1:35	SNACK / BREAK	10–15 minute break, roughly halfway through the session.
1:35–1:45	Teach: Potentiometers	Show how a potentiometer works (variable resistance).
1:45–2:00	Activity 3	Wire an LED to a potentiometer.
2:00–2:10	Teach: DC Motors	Show how a cheap basic DC motor works.
2:10–2:25	Activity 4	Wire a DC motor with a potentiometer.
2:25–2:45	Ending Activity: Troubleshooting	Give each kid a pre-built broken circuit (fault types rotate: reversed LED, wrong/missing resistor, loose wire, dead battery, wrong breadboard row). They must diagnose and fix it — no copying a neighbor's answer since faults differ kid to kid.
2:45–3:00	Conclusion	Recap the day. Give each kid one clear, simple thing to tell their parents (“I built a circuit that lights up when I turn a knob!”).

DAY 2

Meet the Microcontroller

Arduino Uno basics, HIGH/LOW pins, blinking LEDs, servo angles

MATERIALS NEEDED TODAY

- 1 Arduino Uno per kid
- 1 buck converter per kid (with accessible trim pot) + screwdrivers
- Multiple LEDs per kid (for the pattern activity)
- 1 servo motor per kid (or per pair, depending on supply)
- Laptops/stations with PictoBlox installed

Time	Segment	What Happens
0:00–0:10	Recap	Quick recap of Day 1: “Who can tell me what this and this do?” (point at a resistor, an LED, a button). Keep it short.
0:10–0:20	Bridge to Today	Explain the connection: “The circuits yesterday were fixed — with a microcontroller, you change them with code.”
0:20–0:35	Setup: Power	Give each kid an Arduino Uno and a buck converter. Have them use a screwdriver to adjust the buck converter down to 5V. Explain and demonstrate how to wire the Arduino Uno to power. Explain that the microcontroller is what will eventually control the car.
0:35–0:50	Teach: HIGH/LOW	Teach how to set pins to HIGH/LOW using PictoBlox block coding.
0:50–1:00	Activity 1	Connect the Arduino Uno to an LED and make it light up.
1:00–1:15	Activity 2	Make the LED blink. Have kids experiment with changing how fast it blinks.
1:15–1:30	SNACK / BREAK	10–15 minute break.
1:30–1:50	Activity 3	Give kids multiple LEDs and have them program a blinking pattern.

Time	Segment	What Happens
1:50–2:05	Teach: Inputs → Outputs	Teach how to read inputs and translate them into outputs.
2:05–2:30	Activity 4	Teach kids to set a servo motor to a specific angle using the Arduino Uno's PWM output.
2:30–2:45	Free Practice	Extra time to troubleshoot and solidify blink patterns / servo control before moving on.
2:45–3:00	Conclusion	Longer recap than Day 1 since more concepts were covered. Give kids something concrete to tell their parents.

DAY 3

Reading the World

Inputs, the Serial Monitor, and conditional logic

MATERIALS NEEDED TODAY

- Arduino Uno + LED + button + potentiometer setups (reused from Days 1–2)
- Laptops/stations with PictoBlox + Serial Monitor access

Time	Segment	What Happens
0:00–0:10	Recap	Recap Days 1–2 with quick questions. Connect yesterday's servo/input work to today's focus: turning real-world readings into robot behavior.
0:10–0:25	Teach: Toggling	Teach how to toggle a light on/off with a button. Show and explain the code, not just the wiring.
0:25–0:45	Activity 1	Toggle an LED with a button using the Arduino Uno.
0:45–1:00	Teach: Serial Monitor & Analog Input	Teach how to print values to the Serial Monitor and how to read analog inputs.
1:00–1:15	SNACK / BREAK	10–15 minute break.
1:15–1:40	Activity 2	Read the analog input from a potentiometer and watch the values live on the Serial Monitor.
1:40–2:00	Teach: If/Then Logic	Teach if/then statements and conditions. Show and explain the code.
2:00–2:25	Activity 3	Program: if the potentiometer reading is less than half, the LED turns off; if more than half, it turns on.
2:25–2:40	Reintroduce the Car	Reintroduce the robot car and explain what teams will be doing with it starting tomorrow — sets up Day 4's build.

Time	Segment	What Happens
2:40–3:00	Conclusion	Recap the day's logic concepts. This is the last individual-build day — remind kids that tomorrow they move into their teams.

DAY 4

Build Day

Teams form and build the mechanical car

MATERIALS NEEDED TODAY

- LEGO-compatible chassis kits — 1 per team (6 total)
- Pre-wired Arduino Uno + motor driver units — 1 per team, prepared in advance by instructors
- Basic working chassis code, ready to load
- Extra transition/cleanup buffer built into today's schedule (this is the messiest build day)

NOTE

Day 4 is almost entirely mechanical build time. Team planning is a brief ~5 minute talk, not a separate extended activity. This is also one of only two days with a dedicated cleanup buffer, since parts and pieces will be everywhere.

Time	Segment	What Happens
0:00–0:10	Recap & Bridge	Recap the last 3 days and connect it directly to today: “Everything you've learned — circuits, code, sensors — goes into this car.”
0:10–0:15	Show the Chassis	Show the kids the pre-made car kit(s) they'll be building from.
0:15–0:20	Team Talk	Brief ~5 minute discussion of teams. Explain that the hands-on role rotates day-to-day — today's driver/builder won't necessarily be tomorrow's.
0:20–0:40	Activity 1: Design Planning	Teams briefly discuss and plan their car's build approach before diving in.
0:40–1:30	Activity 2: Mechanical Build	Teams build the mechanical part of the car with motors attached, using the LEGO-compatible kits.

Time	Segment	What Happens
1:30–1:45	SNACK / BREAK	10–15 minute break.
1:45–2:30	Activity 3: Wire the Electronics	Give teams the already-wired-up Arduino Uno and motor driver unit for them to physically attach to the chassis.
2:30–2:50	Activity 4: Load the Code	Give teams the basic working chassis code and get their car driving for the first time.
2:50–3:00	Cleanup Buffer + Closing	Dedicated cleanup time for loose parts. If time allows, let teams drive their cars around briefly.

DAY 5

Maze + Distance Sensor

Giving the car "eyes"

MATERIALS NEEDED TODAY

- Cardboard-wall maze, built in advance
- 1 ultrasonic distance sensor per team
- Stopwatch for timed runs
- Team cars from Day 4, charged/battery-ready (6 AA per car)

Time	Segment	What Happens
0:00–0:10	Recap	Recap yesterday's build. Tell them today they'll get their robot to respond to the environment. Show the cardboard maze and explain the day's goal.
0:10–0:25	Teach: Pre-programm ed Movement	Teach how to pre-move the car with code (drive forward for a set time/speed, then turn, etc.).
0:25–0:50	Activity 1: Blind Maze Run	Teams navigate the maze using only pre-given instructions coded in advance (no sensors) — they feel the pain point of not being able to react to walls in real time.
0:50–1:00	Debrief & Teach: Distance Sensor	Talk about how much of a pain it was to navigate blind. Teach how the ultrasonic distance sensor works (sends a ping, measures time to bounce back off a wall).
1:00–1:15	SNACK / BREAK	10–15 minute break.
1:15–1:35	Activity 2	Wire up the distance sensor to the car and read the distance live on the Serial Monitor.
1:35–1:55	Activity 3	Program the car to stop at a certain distance from the wall.
1:55–2:15	Teach: Reading → Turning	Teach how to turn the distance reading into an output — specifically, turning the car instead of just stopping.

Time	Segment	What Happens
2:15–2:45	Activity 4: Full Maze Navigation	Teams navigate the maze using the distance sensor to react in real time.
2:45–3:00	Closing: Timed Runs	Timed runs through the maze between groups (plain stopwatch, fastest time wins, no wall-hit penalty). A re-run is granted only if a wall physically collapses or the car gets mechanically stuck.

DAY 6

Remote Control

IR receiver, NEC protocol, and redoing the maze by hand

MATERIALS NEEDED TODAY

- HX1838 IR receivers (6-pack) + NEC-protocol remotes — 1 per team
- Same cardboard maze from Day 5
- Serial Monitor access for code discovery activity

Time	Segment	What Happens
0:00–0:10	Recap & Finish Day 5	Finish up any unfinished Day 5 activities. Recap the distance sensor work.
0:10–0:20	Bridge to Today	Explain that pre-coded cars only work when you know exactly what will happen — with a remote, you can control the car in real time instead.
0:20–0:35	Teach: IR Communication	Teach how the remote and IR receiver communicate. Explain how the Arduino Uno reads the incoming value and turns it into an output.
0:35–0:50	Teach: Unique Button Codes	Teach that each button on the remote sends a unique code.
0:50–1:05	Activity 1	Get teams to print the incoming codes to the Serial Monitor as they press buttons.
1:05–1:20	SNACK / BREAK	10–15 minute break.
1:20–1:35	Teach: Repeat Codes (live demo)	Teach that holding a button down sends a repeat code instead of resending the unique one. Demonstrate live on the Serial Monitor: have kids press-and-release vs. press-and-hold and let them notice the different/repeating code themselves before it's named.
1:35–1:55	Activity 2	Get teams to print and write down the codes for the forward / left / right / back buttons, including their repeat codes.

Time	Segment	What Happens
1:55–2:15	Teach: Codes → Motor Actions	Teach how to turn the initial code and the repeating code into corresponding motor actions.
2:15–2:45	Activity 3	Teams program their car to turn received remote codes into motor actions (forward/back/left/right).
2:45–3:00	Closing: Redo the Maze	Teams redo the maze, this time using the remote control instead of pre-programmed or sensor-based navigation.

DAY 7

Sumo

Mostly fun — light on new teaching

MATERIALS NEEDED TODAY

- Painter's tape for the sumo ring (~4 ft diameter circle, no raised edge)
- Spare LEGO/electronics parts in case teams want to modify their car

Time	Segment	What Happens
0:00–0:15	Recap	Recap yesterday's remote control work.
0:15–0:30	Explain Sumo	Explain the game objectives and rules. Loss condition: getting pushed out of the taped ring. Losing twice = out of the bracket.
0:30–1:15	Activity 1: Modify	Let teams make changes or additions to their car before Sumo starts (e.g., a pushing attachment, weight redistribution).
1:15–1:30	SNACK / BREAK	10–15 minute break.
1:30–2:50	Activity 2: The Sumo Matches	Run the actual Sumo bracket inside the taped ring. Losing twice eliminates a team. Referee makes the out-of-ring call visually.
2:50–3:00	Closing	Wrap up the bracket, announce the Sumo results.

DAY 8

Soccer

Distance sensor + servo motor working together

MATERIALS NEEDED TODAY

- 1 servo motor per team (kicking mechanism)
- Small foam ball — 1 per team
- Cardboard box goal (on its side) — 1 per team or shared stations

Time	Segment	What Happens
0:00–0:10	Recap	Recap Sumo day.
0:10–0:20	Explain the Challenge	Explain the soccer challenge: the car drives forward, and when it finds the ball, it stops and kicks it. Show what the finished behavior is supposed to look like.
0:20–0:30	Teach: Servo Review	Review how a servo motor works and how it differs from the DC drive motors already on the car.
0:30–0:50	Activity 1	Attach and wire the servo motor to the car.
0:50–1:15	Activity 2	Program the servo motor to perform a “kicking” motion.
1:15–1:30	SNACK / BREAK	10–15 minute break.
1:30–1:45	Teach: Combine Sensor + Servo	Teach how to combine the distance sensor with the servo — drive forward, stop when the ball is detected, then kick.
1:45–2:30	Activity 3: The Real Challenge	Teams program their car to drive forward, stop when it senses the foam ball, and kick it — aiming for the cardboard box goal. Each car attempts the kick individually against a stationary ball/goal (not team vs. team).
2:30–2:50	Bonus Activity (if time allows)	Program the kick to trigger on command from the remote, then try remote-controlled soccer.

Time	Segment	What Happens
2:50–3:00	Closing	Recap what was learned — combining a sensor input with a mechanical output.

DAY 9

Finale Prep

Practice stations + showcase planning

MATERIALS NEEDED TODAY

- All three stations set up: maze (new layout), sumo ring, soccer setup
- Notes/checklist per team for bug fixes

Time	Segment	What Happens
0:00–0:15	Recap the Week	Recap the whole week's journey — circuits, code, sensors, remote control, sumo, soccer.
0:15–0:25	Explain Day 10	Explain what the Day 10 showcase looks like: sequential format, one event at a time, parents watching — maze first, then sumo, then soccer.
0:25–1:15	Activity 1: Station Rotation	Teams rotate through maze, sumo, and soccer stations to practice and fix bugs before tomorrow.
1:15–1:30	SNACK / BREAK	10–15 minute break.
1:30–2:20	Activity 1 (continued)	Continue station rotation and bug fixing.
2:20–2:45	Activity 2: Showcase Roles	Teams decide who does what during tomorrow's showcase — who talks, who drives, who explains the code.
2:45–3:00	Closing (Important)	Remind every kid to tell their parents to show up for Day 10.

DAY 10

Finale Showcase

Parents attend — sequential maze, sumo, then soccer

MATERIALS NEEDED TODAY

- New maze layout (cardboard walls rearranged)
- Sumo ring (taped circle)
- Soccer ball + cardboard goal
- Awards: real trophies for Maze / Sumo / Soccer champions, plus a unique instructor-picked award for every other team
- Extra transition buffer built in before the showcase begins

NOTE

This is a sequential showcase, not simultaneous stations — all maze runs happen first with everyone's attention on it, then all sumo matches, then all soccer. This keeps the schedule simple to run and lets every parent see their kid's moment clearly.

Time	Segment	What Happens
0:00–0:15	Setup Buffer	Extra transition time to get the maze rearranged into its new layout and all three stations ready before parents arrive.
0:15–0:25	Welcome Parents	Explain the format of the day to parents: sequential events, kids will explain their robots before each one.
0:25–1:00	Event 1: Maze	Kids explain to parents how their robot works and how it navigates the maze. Each team runs the new maze layout, timed (fastest time wins).
1:00–1:15	SNACK / BREAK	10–15 minute break for kids and parents.
1:15–1:50	Event 2: Sumo	Kids explain how their robot works and how it drives. Teams compete in the Sumo bracket (pushed out of the taped ring = loss, losing twice = eliminated).
1:50–2:30	Event 3: Soccer	Kids explain how their robot works, drives, and kicks. Each team attempts the ball-to-goal challenge.

Time	Segment	What Happens
2:30–2:50	Awards	Present real trophies to the Maze, Sumo, and Soccer champions. Present a unique, instructor-picked award to every other team based on something specific that happened with that team over the camp — no generic participation trophy.
2:50–3:00	Closing	Let parents and kids take photos. Thank parents for coming and for supporting the camp.