Units	Projects	Focus KSA (SWBAT…)	Continuing KSA
1. Wiring & Circuits	Construct a Light box	Construct simple circuits ● Constructing wires with hand tools (S) ○ Cutting and stripping wire (S) ○ Crimping connectors onto wire (S) ● Identifying conductors & insulators (K) ● Selecting/attaching connectors (S) ○ Attaching alligator clip onto wire (K) ○ Using electrical tape to secure wires (K) ○ Troubleshoot and test wires ● Using Multimeters to test for Conductivity/Continuity (S) Control flow of electricity in circuits (S) ● Switches (K)	
2. Voltage: Parallel and Series Circuits	Construct an LED sign	Creating and understanding the differences between series and parallel circuits (KS) ● Construct a series circuits (K) ● Troubleshooting a series circuit (S) ● Construct parallel circuits (K) Construct wiring panels using Terminal Blocks (K) ● Understanding how Voltage is distributed (K) ○ Understanding Voltage nodes (K) ○ Understanding and measuring Voltage drops (KS) ○ Jumpers (KS) ● Understanding wire coloring conventions (K)	● Constructing wires with hand tools (S) ● Using Multimeters to test for Conductivity/Continuity (S)

		● Using Multimeters to measure Voltage (S) ● Selecting/attaching connectors (S) ○ Attaching spade connectors (S) ○ Using screw terminals (S)	

3. Voltage and Current: Motors	Construct a Personal fan	Constructing a circuit to power a motor using a coin cell battery ● Understanding and using Moderate-voltage systems (KSA) ○ Understanding Safety with circuits (K) ● Understanding how Motors are powered (K) ○ How battery size affects and voltages (K) ○ Understanding torque and stalling of motors (K) Taking a deeper look into why the single cell battery failed ● Measuring Current using a Multimeter (S) ● Understanding current/amperage (K) Creating a larger battery ● How a larger battery could affect voltage (K) ● Understanding larger batteries and charge capacity (K) ● Safety warnings regarding higher voltages and current (K) Changing the circuit so that the motor's direction is changed ● Flow/direction of current in a motor and how it affects the motor (K) Adding a Fuse to your circuit ● AC and DC (K) ● Fuses and breakers ○ Purpose (K) ○ Identifying (KS) ○ Checking (S) ○ Installing/Changing (S)	● Constructing wires with hand tools (S) ● Using Multimeters to test for Conductivity/Continuity (S)

4. Controlling Signals	Construct a 2-wheel cart	Creating a circuit that is powered by a microcontroller (or "brain") ● Programmable controllers (K) ○ Understanding how to set up a basic micro-controller (Arduino Unos) (KS) ○ Understanding and using General Purpose Input/Outputs (GPIO) pins (KS) ○ Plugging into the system ground (KS) ● Using a programming software (KS) ● Selecting/attaching connectors (S) ○ Header pins (KS) ○ Male/Female connectors (KS) ● Basic Programming ○ Uploading program to microcontroller (S) ○ Reading comments in a program (S) Making the LED blink faster ● Programming basic signals (KS) ○ Arduino IDE ○ Blink ○ Comments ○ Parts of program ○ digitalWrite ○ pinMode ○ delay() + milliseconds ○ Uploading programs ○ Modifying programs Incorporating Relays into the circuit to control motors ● Understanding how Relays work (K) ● Understanding how H-Bridges work (K)	● Constructing wires with hand tools (S) ● Using Multimeters to test for Conductivity, Voltage, and Amperage (S) ● Understanding and creating Moderate-voltage systems

		Incorporating a Motor Control Board to control the direction of the motor ● Understanding how to use a Motor Controller Board (KS) ● How multiple-voltage systems work (KS) ● Constructing wires with hand tools (S) ○ Splitting paired wires ○ Three-wire connectors	

5. Sensors	Constructing an Autonomous Kicker	Detecting bumps using a limit switch ● Programming basic signals (KS) ○ Input signals ○ Output signals ○ PULLUP Mode ● Understanding how sensors work (K) ○ Limit Switches Detecting objects from a distance ● Understanding how sensors work (K) ○ Distance/Ultrasonic Sensors	● Selecting/attaching connectors (S) ● Constructing wires with hand tools (S) ● Moderate-voltage systems ● Programming basic signals (KS)
6. E-Panel	Constructing a Power Distribution Panel	Planning and constructing the layout of a electronics board ● Electronics Organization/Planning (KS) ○ Planning Layout (S) ○ Labeling (S) ○ Wiring Harnesses & Conduits (S)	● Constructing wires with hand tools (S) ● Selecting/attaching connectors (S) ○ Header pins (KS) ○ Male/Female connectors (KS)

Broader KSA:

Multimeter troubleshooting (S)
- Opens/Shorts
- Voltage
- Current

Valuing workmanship (A)
- Robustness/reliability
- Organization/neatness

Safety (A)