

Electronics and Programming

Basics - Assessment Rubric

Theme	Skill	Could have been improved	It's fine!	Advanced stuff
Programming	General functionality	The project works but has some minor bugs. There is some unnecessary repetition which may have been avoided with more simple structures.	The program works well enough for its' purpose but is not too sophisticated. Student could have develop the idea with some additions.	The code works perfectly and student has completed a more sophisticated idea with as simple structure as possible.
	Utilization of programming concepts	Variables are named and/or used in a confusing way. The student hasn't understood how to monitor and use input data from Arduino.	The use of variables is clear. Input data is used in a meaningful way but the student cannot fully explain how the program works.	The use of variables, functions and naming is clear and optimized well for the purpose of the project. The student masters the workflow of reading and monitoring input data and using it in an intentional fashion in the project.
	Documentation	The comments are insufficient to understand the program or too long and written in a confusing manner.	It's possible to understand the program based on the comments but some additions would have made the documentation clearer.	The comments provide a clear image of the program. It would be possible to start developing the project with all the information provided.

<p>Electronics</p>	<p>Basic concepts of electronics</p>	<p>Student mixes the terms voltage, current and resistance and doesn't grasp how these are interrelated.</p>	<p>Student can explain the terms voltage, current and resistance, and has an idea how these manifest themselves in Arduino circuits</p>	<p>Student has a clear understanding of the relations of voltage, current and resistance in Arduino circuits.</p>
	<p>Working with circuits and components</p>	<p>Student struggles with using the correct components eg. right resistor values and with connecting the components right way round, to correct pins. Making closed circuits and debugging them is difficult for the student.</p>	<p>Student can debug connections on a breadboard and mostly masters closed circuits, connecting to ground and voltage, and picks the correct components for projects.</p>	<p>Student is able to help others with debugging circuits. Student understands how Arduino supplies voltage to a circuit, and the logic behind PWM output, analog sensor readings and different components.</p>
	<p>Arduino</p>	<p>The student isn't able to explain what Arduino and similar microcontrollers are for or what their basic functionalities are.</p>	<p>Student can explain at least a couple of different uses for Arduino and understands and can mostly make use of the basic workflow (input, how data is processed, output).</p>	<p>In addition to knowing several existing uses for microcontrollers, student is able to ideate new ways to use them. Student can fluently read different inputs to Arduino, has control over data processing and is able to control devices based on the data.</p>
<p>Creative Project Work</p>	<p>General concept</p>	<p>Student hasn't given much thought to the concept of the project or just taken the idea from somewhere else.</p>	<p>The concept is interesting but quite simple.</p>	<p>The concept of the project is somehow distinctive. Technical and creative effort go hand in hand.</p>

	Project-work	Student hasn't had clear goals for the project and it could have been improved easily with the time that the student had. Student hasn't asked for help actively although it could have been needed.	Student has worked steadily and completed a project with the tools introduced in the chapter. Student could have maybe sought help more actively or have set a higher goal for the project.	Student has been able to set goals and work steadily towards them. The goal was appropriate for the tools and time the student had. Student has asked for help actively when facing challenges.
	Giving and receiving constructive feedback	Student hasn't commented the work of others. Student hasn't developed his/her project based on the feedback received from others.	Student has commented projects of others. Student has made some changes to his/her project but could have done more.	Student has given detailed feedback and good improvement ideas about the projects of others. Student has also taken the feedback received from others into account.