

**ECOPLANET s.r.l.**Universidad
Politécnica
de Cartagena

Project: BLUE TEmPLATE BLUE TECh PARtnership Education

Training Program

Profile: Building of the BLUE Remotely Operated Vehicle (ROV)

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Progetto BLUE TEmPLATE
BLUE TECh PARtnership Education

COURSE: Building of the BLUE Remotely Operated Vehicle (ROV)

MECHANICS-TECHNOLOGY MODULE			
Lessons Contents	<ul style="list-style-type: none"> • Introduction to project objectives • ROV: generalities, structures, motors and controls • Materials and properties for chip export machining • Manufacturing capabilities of our workshops • CAD parametric casting and crediting, design and drawing • Machining on the lathe and 3D printer • Executive design of the ROV layout with dimensions and materials • Geometric organisation of the structure • Design of ROV tubular structure and motor support • Purchase of materials and feasibility study • Construction of the support • 3D printing of the container • Feasibility with PVC pipes for exhaust. • Engine design • Hull and engine construction • Engine-propeller transmission shaft • Magnet assembly 		
Abilities	<p>To be able to resolve the static equilibrium of constrained bodies, to decompose compound stresses into simple stresses and assess their strength.</p> <p>To be able to interpret a material certificate, using knowledge of metal cutting to choose working parameters on machine tools.</p> <p>To be able to compile simple ISO programs, knowing the basics of CNC programming.</p> <p>To be able to choose a suitable motor for the required purpose.</p>		
Knowledge	<p>Forces, moments and vectors.</p> <p>Units of measurement of the international system and basic metrology. General knowledge of different types of materials</p> <p>Characteristics of ROV components</p>		
Skills	<p>Understand the development and succession of machining phases of a mechanical part.</p> <p>Understand the programming logic of a CNC machine.</p> <p>Understand the design and construction logic of a robot.</p> <p>Understand the programming logic of a robot, including the mechanics of movement.</p> <p>Understand the logic behind the construction of a ROV.</p>		
Lessons time	25 hours in total		
Training methods	<table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <input checked="" type="checkbox"/> class lessons <input checked="" type="checkbox"/> debriefing <input checked="" type="checkbox"/> practice/exercises <input checked="" type="checkbox"/> training dialogue <input type="checkbox"/> problem solving </td> <td style="vertical-align: top;"> <input checked="" type="checkbox"/> workshop <input type="checkbox"/> project work <input type="checkbox"/> simulation – virtual Lab <input type="checkbox"/> brain – storming <input type="checkbox"/> Other (<i>specify</i>)..... </td> </tr> </table>	<input checked="" type="checkbox"/> class lessons <input checked="" type="checkbox"/> debriefing <input checked="" type="checkbox"/> practice/exercises <input checked="" type="checkbox"/> training dialogue <input type="checkbox"/> problem solving	<input checked="" type="checkbox"/> workshop <input type="checkbox"/> project work <input type="checkbox"/> simulation – virtual Lab <input type="checkbox"/> brain – storming <input type="checkbox"/> Other (<i>specify</i>).....
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ELECTRONIC AND PRECISION ELECTRONIC MODULE			
Lessons contents	<p>Electronics: electronic components, circuits and devices. Sensors, transducers and classification Types of programming and use in electronics.</p> <p>Electric motors: choices and main parameters of a Brushless motor.</p> <p>Brushless motor operation and reversing. Testing of a brushless motor</p> <p>Absorption 4 motors and brushless and speed control</p> <p>Voltage measurements, correction, disturbances with the oscilloscope</p> <p>Arduino: board inputs and outputs, board program structure</p> <p>BLDC motor reversal with ESC using Arduino: design scheme, hardware and software system operation</p> <p>Electrical screen for reversing a brushless motor with ESC, relay and Arduino Uno. H-bridge with MOS and PWM technique</p> <p>0-10V LED power supply and motor service control for the camera zoom which the Arduino and Galileo board</p> <p>Block diagram and construction of a circuit and testing. Overall dimensions, cards for designing millefori boards</p> <p>Circuit diagram with LCD display on Master.</p> <p>Arduino Master-Arduino Slave communication with max485 converters in Half-duplex mode.</p>		
Abilities	<p>Apply physical principles to the study of linear and non-linear electrical and electronic components, circuits and devices. Knowing how to choose suitable sensors for the most common situations. Design various types of control and data acquisition systems.</p> <p>Creating tests for serial communication with RS485 between master and slave. Controlling the LED spotlight via the L298 driver via serial communication.</p> <p>Soldering electronic components on a millefori board: Desoldering components</p>		
Knowledge	<p>Electrical quantities. Basic EL and ET laws. DC and AC network solution method. Sensors and Transducers. Basic OpAmP configuration Combinatorial and sequential electronics</p> <p>Control and interface circuits and devices.</p>		
Skills	<p>Understand the logic of design. Understand the logic of programming.</p>		
Lessons time	<p>25 Hours in total</p>		
Training methods	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> class lessons <input type="checkbox"/> debriefing <input type="checkbox"/> practice / exercise <input checked="" type="checkbox"/> training dialogue </td> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> workshop <input type="checkbox"/> project work <input checked="" type="checkbox"/> simulation – virtual Lab <input type="checkbox"/> brain – storming </td> </tr> </table>	<input checked="" type="checkbox"/> class lessons <input type="checkbox"/> debriefing <input type="checkbox"/> practice / exercise <input checked="" type="checkbox"/> training dialogue	<input checked="" type="checkbox"/> workshop <input type="checkbox"/> project work <input checked="" type="checkbox"/> simulation – virtual Lab <input type="checkbox"/> brain – storming
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WORKSHOP ACTIVITIES (16 HOURS)
Survey methodologies (bathymetry, seabed morphology, seismic, marine sediment sampling, ROV inspections)
Main fields of application
Basic information on the used instrumentation
Examples of processing and reading of acquired data
Basic information on survey planning: chemical-physical, geophysical and biological
Organisation of the construction team. Management of technical project developments, multidisciplinary development
Reliability of surveys