Prototyping Functional Applied to VEX Robotics
Summary

Conception Of Design Phase 01
Design and materialization work for the execution of integrated tests carried out by university students

Conception Of Design Phase 02
Design and materialization work done by professional instructors

Integration and Testing Environment
Development of commands for moving and testing with the analysis of projections
VEX Robotics Design

Introduction to Platform Integration

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Vex Robotics

Prototyping Of Object Re-adjustment

Use of Biomechanics in 3D Modeling

By replacing traditional production methods with internal solutions, 3D printing gives various sectors of project design tracking the opportunity to save time and money.

In robotics there are several elements that must be manipulated from one point to another as it picks up, picks up and places parts in processes previously programmed for the electromechanical system.
Established possibilities for mechanical devices with the integration of industrial technologies 4.0

**DEVICE**

Several robotic industrial systems have been developed up to now, including commercialized products. Since then for specific applications it becomes necessary to integrate engineering skills to suit the needs and to overcome spatial barriers between the area of operation of the mechanical device in unknown situations during a certain task to be performed.

**3D PROTOTYPE**

With the minimalist concept of the Additive Manufacturing process (3D Printing). Students integrated into the new custom component development project can create different types of parts so they can quickly adapt the geometry of the element to be manipulated. As this process is integrated without using traditional resources of the obsolete industry, there is a real possibility of saving time and costs and can do much more testing for effective integration.

**INTEGRATION AND TESTING**

Design concept applied according to the element to be manipulated while maintaining the originality of coupling positioning. Elaboration of spare parts focus:

- Reduction of fill of material saving the time of production.

- Simplified design to facilitate in the 3D printing process.
PROJECT PROCESS

Implementation by university students of PUC-SP BRAZIL

Entrance Fee: $20 adult / $15 student / 12 child 12 and under
Vex Robotics

Prototyping Of Object Re-adjustment

Use of Biomechanics in 3D Modeling

The processes of manufacturing and development are always in constant change this evolutionary process becomes a significant factor for the development of customized components, which presents possibilities of advanced features in direct production.
Established possibilities for mechanical devices with the integration of industrial technologies 4.0

DEVICE

The process is exposed to a new reflection implementation with a docking mechanism that allows movement and direct contact with the object of manipulation.

3D PROTOTYPE

The adoption of 3D design shortens the process of integration and testing in this challenge, along with Fusion 360 software professionals have worked with a high level of cooperativism within the development of custom design. More localized, more collaborative possibilities offer more significant benefits for sustainability.

INTEGRATION AND TESTING

Design concept applied in custom components and fast production. Main points of design:

- Simple for the productive process of 3D printing.

- At the end of the developed components has recesses for greater grip in contact with the object.
PROCESSO DE PROJETO

Implementation by professionals in the industrial area SENAI - Armando de Arruda Pereira

INTEGRATION FUSION 360
Applied to 3D modeling in immediate solutions
Vex Robotics

Integration and Testing Environment

Use of Tools for Integration and Analysis

```python
setMultipleMotors(50, M10, noMotor, noMotor, noMotor, noMotor);
wait(4, seconds);
repeat (forever) {
    if (SensorValue[81] == 1) {
        setMultipleMotors(-50, M1, noMotor, noMotor, noMotor, noMotor);
        wait(1, seconds);
        stopMultipleMotors(M1, noMotor, noMotor, noMotor, noMotor);
        setMultipleMotors(30, M1, noMotor, noMotor, noMotor, noMotor);
        wait(1, seconds);
        stopMultipleMotors(M1, noMotor, noMotor, noMotor, noMotor);
    }

    if (SensorValue[89] == 1) {
        setMultipleMotors(30, M9, noMotor, noMotor, noMotor, noMotor);
        wait(1, seconds);
        stopMultipleMotors(M9, noMotor, noMotor, noMotor, noMotor);
        setMultipleMotors(-30, M9, noMotor, noMotor, noMotor, noMotor);
        wait(1, seconds);
        stopMultipleMotors(M9, noMotor, noMotor, noMotor, noMotor);
    }
}
```
Vex Robotics

Integration and Testing Environment

Use of Tools for Integration and Analysis
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Integration and Testing Environment

Use of Tools for Integration and Analysis
Functional Prototyping Applied to Robotics

The processes described here are previously developed and tested in the Laboratory - Nucleus of Robotic Engineering and Sustainable Educational Development.

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INTEGRATION

A SUMMARY ON INTEGRATION ACTIVITIES CARRIED OUT BY THE NUCLEUS

ROBOTIC ENGINEERING CORE AND SUSTAINABLE EDUCATIONAL DEVELOPMENT