

## STEM into the sky program

### Program Introduction

Nothing was more challenging to humans as getting into the sky. We all remember Abbas Ibn Farnas, Wright Brothers, and many successful attempts to get into the sky. It's now your turn to go through this exciting challenge and fly things in the sky, Amazing, isn't it!?

The program is intended to help you apply many inter-disciplinary concepts which the theme of how all our programs are. We avoid such unipolar or objectiveless approaches. This program will give you more knowledge from different fields as well tremendous engineering as well personal skills. This is how things go around here.

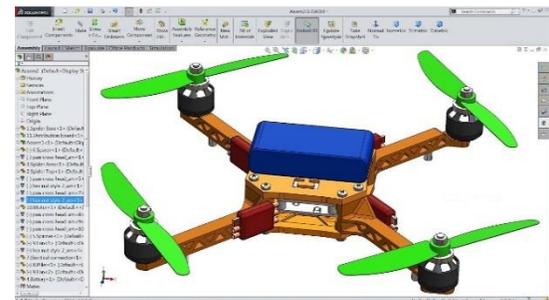
The goal of this program is to understand the scientific (Physical, Mathematical, and Aerodynamics) background of aeronautics, the principles of design with CAD, modify, and make improvements in the design under simulation Software (LabView) to test all parameters of flight. Fab Lab which will be a very exciting experience.

Complicated!?, we haven't come to the hard parts yet 😊

Then comes the implementation phase, including frame, motors, electronics, speed controllers, Arduino Coding development, and sensor boards. Cameras, Batteries, a transmitter, a receiver, a GPS module, Sim card for building communication channels, and more interesting stuff.

Wow! Right 😊

So, is it just about having fun? Well, Yes, it's about fun as well as many useful objectives.



Collecting data in a specific region such as mapping terrains, gathering and store CO2 and pollution data.

Weather data collection, maybe video shooting

techniques (Make sure you share your first aerial video with us 😊, you can be more creative to build a future concept flying car and take it for long-lasting auto flight.

Hey, How about the first Egyptian Aerial Combat League 😊

Share your ideas to show us the best you can do 😊



## Program Skills Structure

- Objectiveless approach isn't what we intend to deliver. There are certain set of skills that are highly targeted to you. These skills will be the core value that we present. Each one will be a trigger for the other, so the skeleton of our programs is truly the essence of those skills. As illustrated in this gear mechanism - Get used to this, sooner you will understand, design, and build a complicated gear system of your own 😊-.

Knowledge gear is what drives us all, the true and the very meaningful value we need you to acquire.

Then here comes the next gear -Practice- where you will do science and knowledge. However,

teamworking gear is very essential aspect of our programs.

In response to the previous gears, You and your team will be assigned to tasks through the program. You will learn how to manage your time and collaborate with your team mates to accomplish them. Success isn't just about building great things, the economic and business management skills are also crucial in our program to prepare you for a challenging tomorrow's world experience.



- **Scientific and knowledge skills**

This is the main core of any program we provide. It's not about making fancy stuff without getting into the essence of what and how they are according to the science and knowledge perspectives. Don't worry, we will prepare you so well for that to take you to the exciting part of building your flying machine.



- **Engineering and Hands-on skills**

After you got the knowledge, now it's time to practice it. Using different machines, instruments, equipment, and tools. Enjoy creating something from scratch and make it alive. Nothing can be more joyful than that. You will love the mess you will do in favor of making your first flight. But wait, it's not only about you, you should do that with your team mates. So, Make as mess as you all want 😊



- **Personal and Teamwork Skills**

We are humans, Right? We can't live by ourselves. Although we have different personal and social backgrounds, but we need to learn how to work as a team to accomplish the assigned tasks and pass them. You and your mates may get into opposite opinions, frustrated with different decisions, or even passing through hard times. You will not have the privilege of selecting whom you are working with, Life isn't always generous. It's a lesson in your whole life far more than getting a project done. It's about how to be one for all and all for one. You also would go through challenging experience of making business model for you project. It is gonna be a great leap in building your character to get ready for the future.



## Program Progress Phases

### Phase 1 - Preparation

In this phase you will be introduced to the principles of aeronautical engineering, aerodynamics, Fluid mechanics of air, and scientific theories behind aircraft machines as well as starting building simple models. The objective skills set for this phase are as follows

- **1.S: Scientific and knowledge content**  
Physics of aeronautics, Aerodynamics basics and analysis of different models, Mathematical models for aircraft mechanisms, Basics of turbine and motors mechanisms, and last but not least structure analysis of different aircraft models.
- **1.E: Engineering Practices**  
Case studies for selected designs, measuring or calculating key factors of aircraft modelling, researching for efficient aviation techniques, and design a model for simple aircraft.
- **1.H: Hands on Activities and checkpoint assignment**  
Building and testing a cardboard model of the aircraft you designed.

## Phase 2 - Design

In this phase you will be through something exciting, learning whatever it takes to start designing your project. CAD Software, design structure, mechanisms, electronics, microcontrollers, sensors, motors, simulations Apps, etc.

- **2.S: Scientific and knowledge content**  
Electronics, sensors, controllers, Batteries and advanced aeronautical mechanisms scientific principles.
- **2.E: Engineering Practices**  
Aircraft CAD (Solid Work), Coding (Arduino), Electronics CAD (MultiSIM), Simulation and Test parameters (LabView).
- **2.H: Hands on Activities and checkpoint assignment**  
Complete CAD and Simulation test of the aircraft with all features (Mechanics, Electronics, Control, Sensors, Battery power management, etc.). Specify what exactly your aircraft will achieve and how this can be authentically measured.

## Phase 3 - Implementation

In this phase, all your dreams shall come true. It will completely dedicated to building your aircraft from scratch. Enough about theories and formulas or equations. It's now time to put all the designs and simulations into a real thing.

You will not succeed from your first attempt, YES! 😊.

Unless you are a real geek, you will go back to re-design, re-simulate, and re-whatever to make it happen and enjoy watching your aircraft in the sky.

### **3.E: Engineering Practices**

Fab Lab, Real time components testing, Re-Design and Re-Implement.

### **3.H: Hands on Activities and checkpoint assignment**

Project Construction, Real operation with all specified functions working

Final Assignment😊 : Make it Happen, Fly