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DEVELOPMENT OF A LOW-COST AND USER-FRIENDLY MODEL ROCKET FLIGHT
COMPUTER WITH THRUST VECTOR CONTROL CAPABILITY**Abstract**

This research outlines a project aimed at designing a flight computer control system for a model rocket, with the objective of achieving thrust vector control (TVC) on small solid rocket motors, in order to enable flights with a more vertical trajectory. The project outlines the design of a low-cost and user-friendly single-board model rocket flight computer, made by an undergraduate student, which uses Raspberry Pi's RP2040 dual-core microcontroller as the main processing unit, along with easily available components like the BNO055 9-DOF Inertial Measurement Unit and BMP581 barometer. In order to eventually scale up the project, the ADXL375 high-G accelerometer was added to better support larger rocket motors, in addition several expansion connectors have been built into the board, to provide expansions such as GPS or radio link between the flight computer and a ground station. All these components are placed in a single 4-layer PCB. The study will involve the design of a TVC motor mount and will describe the control theory equations necessary for accurately controlling the rocket. In order to achieve this, several simulations will be implemented, to verify the motor mount's strength and calibrate the TVC algorithm. In addition, the research will explore the idea of implementing the TVC and a fin control system on a tensegrity model rocket fuselage developed by another team.