UAS Flight and Payload Challenge
Air2IT LLC

Plant Utilities Engineer 1 Workleader

Joshua Wojnas

CEO Air2IT LLC

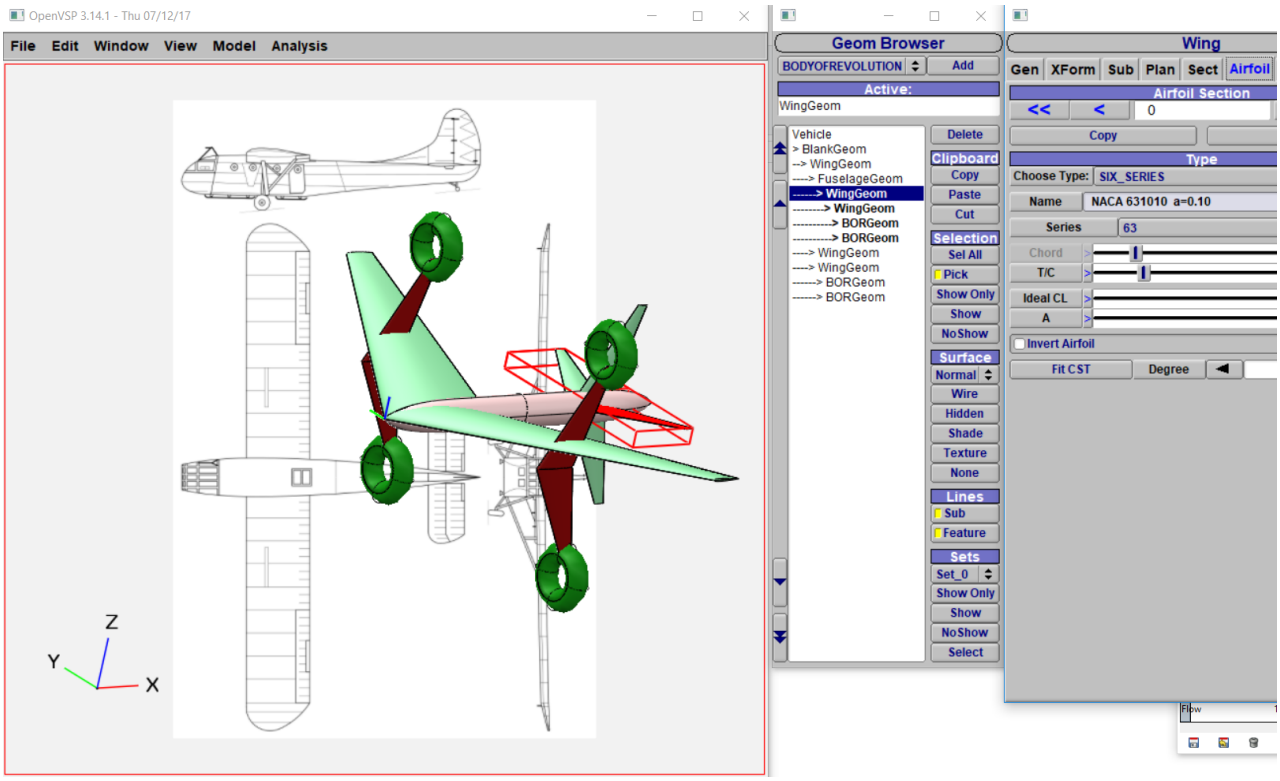
CONCEPT PAPER CONTEST (Stage 1)

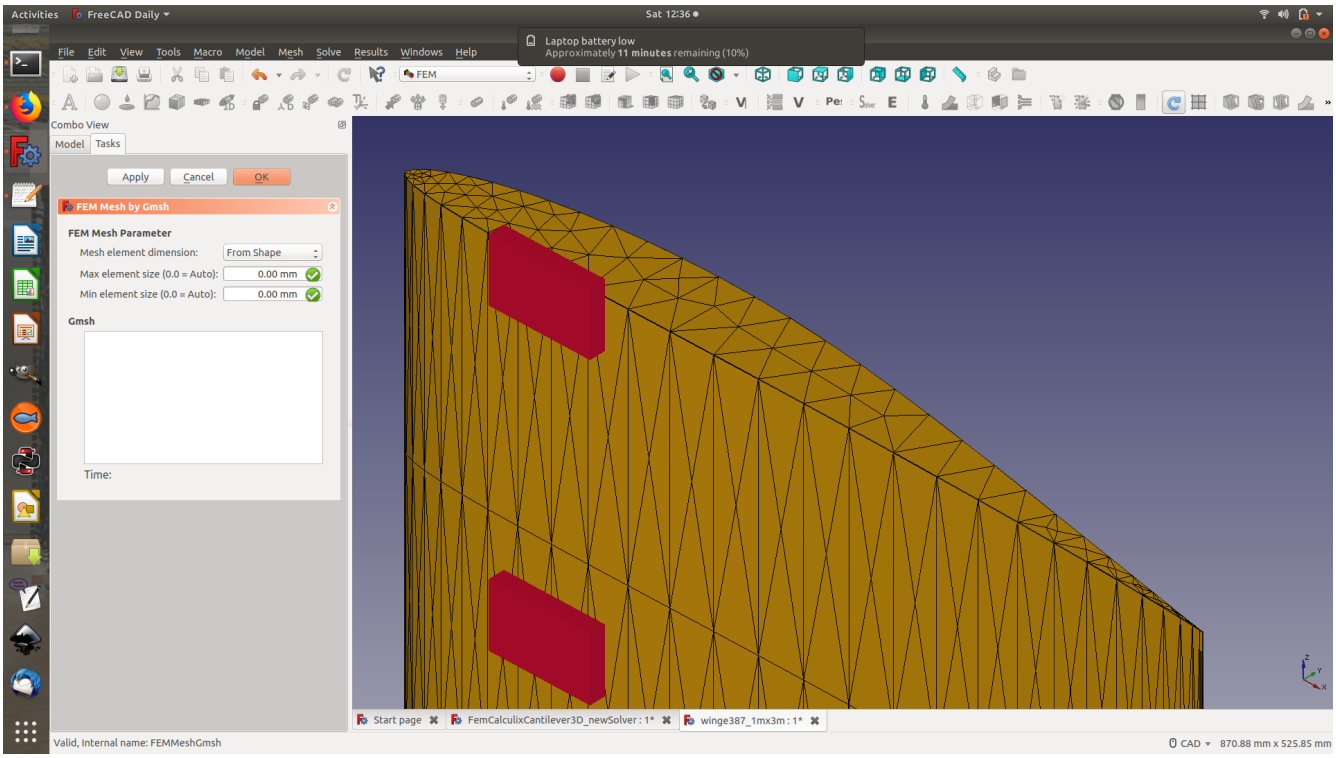
Introduction:

This Paper is a concept paper outlining knowledge, skills, capabilities and approach for this challenge.

- Knowledge control systems for pneumatics and electronics, circuit board design, quadrotor uav building troubleshooting, repair, upgrades, and waypoint programming in mission planner using pixhawk,
- skills experience in information systems mechanical drives, speed controls, video editing,
- capabilities UAV Design using experience and modern materials and mechanical advantage and new piloting hardware and software, and NASA OpenVSP analysis, and kicad FEM analysis to keep the design trim.

- approach efficient lifting body and repeatable design with modular components.
- Optional Glider wings, airfoil E387 and flying foam wings with two carbon fiber tube holes for a box design of a optional glider for a tail sitting vtol for maximum range using pixhawks software that works with transitional flight. Also dragon plates carbon fiber tube and connector system used by NASA and Boing. Nanotech batteries for good power to weight and maintenance features. There getting FEM information for their carbon fiber tube system.
- Assistance or information on using OpenVSP would be helpful and FreecadFEM



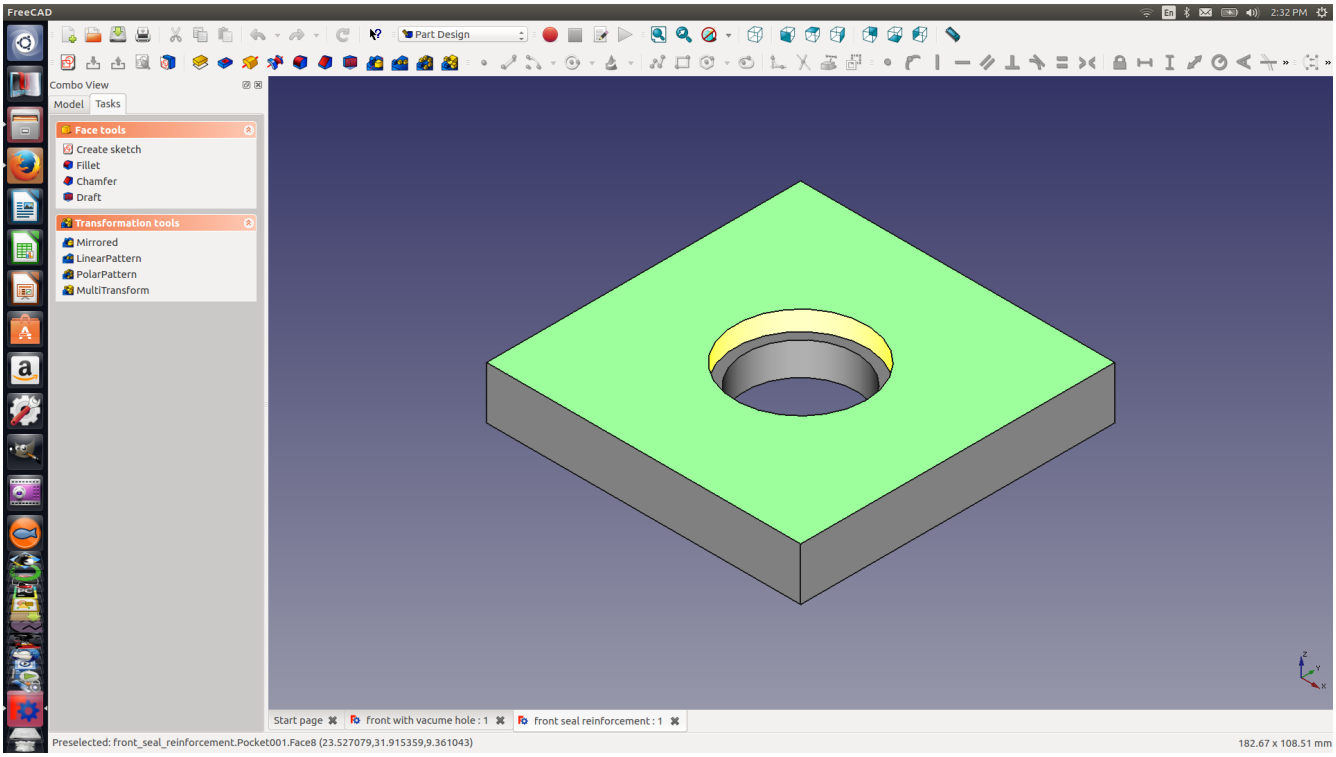


UAS Concept Design Specifications

Aircraft requirements and limitations:

- a UAS that is customized for the specific flight time and payload requirements of the challenge;
- Allready made and used a UAV capable of autonomous and human controlled flight using ardupilot, mission planner and Pixhawk. With 3d robotics airframe pieces;
- Allready made and used a Vertical take-off and landing (VTOL) UAS with the ability to hover in place using ardupilot, mission planner and pixhawk and a 3d robotics frame modified;
- Allready made and uesd a UAV with no tethers but tethers for Cross Wind Kite Power is a interesting application of this technology. (notes on it could be included but wikipedia calculations I believe are wrong.;
- It will include the interchangeable payload adapter for this challenge; I have used a model rocketry radio controlled pull pin on my drone to drop paper balls with the pixhawk and waypoints on mission planner.
- Allready made and used a UAV using mission planner and pixhawk to have a switch on the remote that initiated a program to fallow waypoints, return to launch, loiter, land now. So that should cover, “Must include a flight termination system or “kill switch” to end flight if necessary” and FTS it also had a flight corridor or invisible fence so if it went outside that fallow a program.
- UAS energy source is safely integrated into the flight system will use new battery technology purchasable from hobby king comparing the kw/kg. TURNIGY nano-tech Lipoly batteries seem to be the best.

- Turnigy Graphene https://hobbyking.com/en_us/turnigy-graphene-professional-12000mah-6s-15c-lipo-pack-w-xt90.html
- TURNIGY nano-tech Lipoly batteries https://hobbyking.com/en_us/turnigy-nano-tech-10000mah-2s-30c-lipoly-battery-w-traxxas-connector.html
- Entire prototype UAS must fit within 6 ft. or 72 “ in x 4ft or 48” in x3 ft., and weigh no more than 55 pounds (UAS + payload); Effective use of NASA OpenVSP software would allow for simulation analysis of the weight and drag and forces on the unit allowing strength to be added and risk scaling and not over building or building in enough supports could be possible. Dragon Plate is getting the FEM analysis information on their product. Help with OpenVSP would help the outcome the documentation is limited. Blanks in OpenVSP could have weights for Center of gravity calculations.
- Radio system could be gotten to match the pixhawk mini but must have connectors adapted. Must have continuous radio communication with the UAS Controller and be capable of multiple channels or frequencies...
- Platform, on-board systems, and UAS controllers are commercial, off the shelf for repeatability and mass manufacturability all components to the UAS system can be purchased or created within the $20,000 hardware budget. Probably 2k$.



Evaluation Criteria:

Concept Papers are evaluated based on the following criteria:

Strategic Alignment – The extent to which the proposed approach meets the objectives listed in the goals of the challenge; the responsiveness to the firefighter and law enforcement scenarios; the likelihood that successful implementation of the proposed solution will have a significant real-world impact.

This design could drop needed supplies to a firefighter or life vests to coast guard or intelligence for law enforcement, trafic monitoring platform for speeding and trends. Orange Data Mining and OpenCV for computer vision processing with rasbery pi 3 and data mining using hierarchal clustering and kmeans clustering. If a small open source automated century gun was mounted below it could provide cover to law enforcement. It does this with efficient minimalistic design with mas manufacturing in mind and reliability with maximum wing size for the contest so maximum cl wing design for gliding for most efficient electric flight with optimal batteries and regenerative breaking electronic speed controllers open source VESC.

Technical Outcome – The cost and build, difficulty is low. The efficient batteries, regenerative breaking, wing design based on a glider for efficient mechanical lift all would make it a low cost way to have vtol cost per distance moved per UAV per kg. Open source tech so as it grows your design grows and builds on OpenVSP, Freecad FEM, Kicad, VESC, pixhawk mini,

Team – The experience in my resume for usajobs.gov and experience in drones you can see on the Air2IT facebook page. Also I have a list of more resources and as this is designed a detailed parts list and blueprints could be made for mass manufacturing.

Plan – The design could be over built with 1 inch od carbon fiber tubes and would still work it just would be able to scale more before if the fem analysis was completed it could be found without costly distructive testing. The design would be built using references for the design perimeters as the design is built off modules the modules could be tested. The limited documentation of OpenVSP and freecad FEM could be bypassed by a overbuilt design and fallowing past best practices.

Resume will attach letter of recommendation.

Joshua L Wojnas

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New Hartford, NY 13413 US

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Email: joshua.wojnas@gmail.com

Work Experience:

Mid State Correctional Facility Power House 04/2013 – Now

9005 Old River Rd Marcy, NY 13403

Plant Utilities Assistant

Supervisor: Tom Laquidara (315) 768-8581

Repair and monitoring of the electromechanical components of a high pressure steam plant that provides heat and hot water to three state

facilities. Tuned PID Control systems to optimize plant performance.

General Electric 01/2008 - 06/2011

1 River Road

Schenectady, NY 12345 United States

Technical Records Digital Archives Manager , Research Librarian

Supervisor: Lisa Lawyer 804-763-2235

Duties, Accomplishments and Related Skills: Supervised a records and information management team tasked with digitizing records,

establishing a keyword retrieval indexing system, and developing various database designs. Actively participated in developing and

updating records as well as information management policies, procedures, and guidelines. Analyzed and modified business processes

related to digitizing, legacy, and information maintenance. Prepared Quality Control (QC) and project status reports for presentation to

management.

DATABASE CONSTRUCTION AND MANAGEMENT: Maintained databases covering user requests and document locations. Built

and managed spreadsheets to track documents and project progress. Wrote Structured Query Language (SQL) queries for numerous

networked corporate databases to assist end-users with rapidly exacting data for weekly reports and other special needs. Assisted Xerox

scanning operators and internal customers with devising data search strategies, structuring SQL queries, database logic, and other similar

tasks. Wrote SQL scripts within a UNIX-operated mainframe designed to extract data. Assisted in the design of a user-friendly Graphic

User Interface (GUI) published on the corporate intranet. Used Adobe Optical Character Recognition (OCR) to create a keyword-

searchable electronic collection.

INFORMATION ASSURANCE AND SECURITY: Set up and modified database security access control lists based on pre-existing

corporate access policies. Upheld strictest confidentiality and security in digitizing classified records and sensitive information into the

electronic library system. Maintained watch over access to secured records, noting any irregular activity.

CUSTOMER SUPPORT AND TRAINING: Trained customers in electronic records search and report generation. Troubleshot issues

arising with SQL database queries, the database structure, and data records integrity within existing databases. Wrote technical documents

covering step-by-step instruction on data querying and database usage. Earned recognition as a Subject Matter Expert (SME) in Adobe

Pro. Responded to trouble tickets filed via the Remedy helpdesk system. Restored user access to networked systems. Assisted with

password resets, new user accounts, and basic troubleshooting. Mined stored data to create reports in response to customer telephone

requisitions. Assisted Xerox scanning operators via telephone with troubleshooting technical issues. Gave oral presentations to audiences

of varying knowledge and levels on complex database and reporting operations.

INVENTORY CONTROL: Collaborated with managers to ensure inventory schedules were developed and implemented in a timely

fashion. Monitored the progress made pertaining to inventory issues, reconciled property records, and prepared corresponding reports.

ACCOMPLISHMENTS:

* Improved the organization’s on- and offsite records storage program by converting paper records into digitized, keyword-searchable

records.

* Utilized the Engineering Digital Red Book (EDRB) to develop, maintain, and improve record resourcing and archiving via an internal

intranet.

* Advanced the department’s records retrieval request by marrying new indexes into a single database, thus improving query searches.

* Reduced annual expenses associated with paper records via the digitizing and indexing processes.

Opto Generic Devices, 07/2007 - 11/2007

174 Pumpkin Hook Road

Van Hornesville, NY 13475 United States

Electrical Engineering Technician

Supervisor: Ormonde Durham (3158581002)

Duties, Accomplishments and Related Skills: Served as a technical support specialist tasked with troubleshooting product discrepancies

and providing customers with assistance on the use of various company products. Designed the company’s website using HyperText

Markup Language (HTML).

TECHNICAL MANAGEMENT: Expertly resolved digital and analog circuits found in HVAC (Heating, Ventilation, and Air

Conditioning) equipment by using various electronic testing equipment. Provided feedback to manufacturers and company engineers to

help resolve technical issues. Edited schematic drawings for aftermarket control systems HVAC equipment, increasing efficiency.

Prototyped electrical circuits, HVAC equipment aftermarket thermostat, remote control systems, power management circuitry, and motor

soft starter system.

TECHNICAL WRITING: Wrote technical manuals and project documentation. Prepared flowcharts and spreadsheets to supplementmanuals that accompanied company’s HVAC equipment aftermarket thermostat and remote control systems as documentation for

equipment design. Using Adobe Photoshop, edited photos of prototypes for inclusion in end-user documentation.

ACCOMPLISHMENT:

* Detected an improper controller board within a heat pump system that was repeatedly malfunctioning. Identified the

controller board’s manufacturer and located an alternative solution that resolved the controller board issue. Also

uncovered a deficiency in heat pump’s power supply and worked with the manufacturer to correct it.

NYS Comptroller 05/2007 - 07/2007

110 State Street

Albany, NY 12207 United States

Technical Research Librarian

Supervisor: Rose Delveccchio (5184735960)

Duties, Accomplishments and Related Skills: Performed various technical and research assignments in support of the New York State

Comptroller’s projects and programs. Built and managed complex relational databases and spreadsheets using Microsoft (MS) Office

products (Access and Excel, respectively) used to aid sophisticated indexing functions within the Comptroller’s library. Fulfilled

additional responsibilities in customer technical support and inventory control.

DATABASE MANAGEMENT: Designed, tested, and managed complex MS Access relational databases used in indexing functions,

reporting, and indexing. Inputted keywords and other information, as necessary, to keep indexes current. Created report functions within

the databases to expedite data extraction and reporting. Developed simple and compound queries to extract data via specific search

criteria into database report templates. Designed an appealing, userfriendly GUI front for the databases. Performed technical

troubleshooting of SQL database functions, including forms, reports and queries. Used Adobe OCR software to create a keyword-

searchable electronic inventory control function.

CUSTOMER SERVICE: Delivered support via telephone to internal and external customers in need of technical troubleshooting for

their relational databases. Provided informal training and introductions to office staff on new database functions and features. Formally

presented information to colleagues and managers on various topics specific to job responsibilities and technical functions.

ACCOMPLISHMENTS:

* Created a keyword-searchable database featuring a cross-referencing function of the New York State Constitution that

significantly expedited staff research.

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Used Adobe OCR software to create keyword-searchable electronic inventory control functions.

SUNY Institute of Technologies Library 09/2005 - 05/2006

100 Seymour Road

Utica, NY 13502 United States

Library Clerk

Supervisor: Barbara Grimes (3157927245)

Duties, Accomplishments and Related Skills: Assisted the circulation desk director of the SUNY Institute of Technology Library in

performing a myriad of inventory management and customer support functions, including technical troubleshooting of networked

computer equipment, database structuring and queries, and reporting. Helped resolve technical issues related to Internet connectivity,

database functions, including indexing and searches, microfiche, network printing, information retrieval, and software troubleshooting.

Education: Masters of Science and information systems at SUNY Albany Albany, NY United States Master's Degree 05/2008

GPA: 3 of a maximum 4

Credits Earned: 42

Major: MSIS

Relevant Coursework, Licenses and Certifications: Web Database Programming; Fundamentals of XML; Fundamentals of Records

Management; The Information Environment; Administration of Information Agencies; Information Storage and Retrieval; Internet and

Information Access; Research Methods; Systems Analysis in Information Environment; Information and Knowledge Organization;

Information Systems; Microcomputer Database Development; Current Problems in Information Studies; Developing User Interface

BAS in Electrical Engineering Technologies Utica, NY United States Bachelor's Degree 05/2006

GPA: 2.88 of a maximum 4

Credits Earned: 130 Semester hours

Major: EET

Relevant Coursework, Licenses and Certifications: Computer Programming; Written Communications; Advanced Digital Systems

Design; Control Systems; Microprocessors/Embed System Programming/Design; Microprogramming; Microprogramming/Computer

Architecture; Microcontrollers; Differential Equations; Drawing; Report Writing/Technical Communication; Introduction to C

Job Related Training:

Comp TIA Security + certification 10/22/2011

Export Control Certified at General Electric

Class 4 Security Clearance at General Electric

Additional Information:PROFESSIONAL SUMMARY: Versatile technology professional skilled in data management, data mining, and indexing. Create and

manage robust databases that simplify indexing and advanced search functions of archives. Apply sophisticated technical knowledge

pertaining to hardware, scanning software, and networking features associated with data mining and reporting functions. Additional

expertise in administering Local Area Networks (LANs) and Wide Area Networks (WANs), user access, data backups, Information

Security (INFOSEC), and bandwidth issues.

SPECIFIC QUALIFICATIONS: Ability to communicate effectively, both orally and in writing; information management; Information

Assurance (IA); Quality Control (QC); security; database development; data mining; reporting; presentations; troubleshooting; technical

prototyping; web design; inventory control; Information Security (INFOSEC); training development and administration; Information

Technology (IT); reporting; systems application development; networks; LAN/WANs; customer support; schematic editing

TECHNICAL PROFICIENCIES:

Operating Systems (O/S): Linux, Windows XP and 7; Ubuntu Linux. Able to write Windows and Linux batch scripts to work with files

and reporting functions

Software: Adobe Pro, Microsoft (MS) Office (Word, Excel, Access, PowerPoint, Outlook), MS Visio, OpenOffice, LibreOffice,

LibreOffice Base, Drupal Content Management System, Adobe Photoshop, Adobe Illustrator, MS Paint, Apache

Programming Languages: PHP, SQL, Java, HTML, C programming for PIC Microcontroller, Motorola 6800 assembly language, CSS,

CGI, XML

Microprocessors: Microchip 68hc11, PIC, embedded design, Arduino, AVR.