

### **Electronics Shop Services:**

The following is a list of services that the Electronics Shop personnel can provide to researchers.

#### **1. Consulting:**

- A) General electrical and electronic implementation and design**
- B) Equipment selection with regard to function, specifications, alternatives**
- C) Discrete circuit design and part selection with respect to mechanical considerations, electrical parameters, limitations, alternatives, etc.**
- D) Grounding, shielding, or isolation of devices or systems**
- E) Troubleshooting of faults in set-ups or equipment**
- F) Connectivity of parts or equipment with regard to matching and noise reduction**
- G) Examination and identification of safety issues and standards**

#### **2. Custom analog and digital design and fabrication:**

- A) Measurement devices such as conductivity, rpm, voltage, current, flow, temperature, field strength, etc.**
- B) Transducer amplifiers for low level voltage or current signals such as strain gauges, moving coil devices, liquid sensors, voltages levels in living tissue, etc.**
- C) Research apparatus or instruments**
- D) Automated apparatus for data acquisition**
- E) Microcontroller based products employing Motorola, Microchip, or other microcontrollers.**
- F) Products for use with microcontroller based targets**
- G) Personal Computer based devices for connection via parallel, serial, or alternatively indirect connection through data acquisition boards.**
- H) Construction of Printed Circuit boards in-house or externally processed with plated through holes and silk screening**

#### **3. Software Design:**

- A) Computer and microcontroller programming using LabView, Visual C++, Visual Basic, Java, low-level machine code, etc.**
- B) Analysis of electronic devices using MicroCap, Workbench**
- C) PCB layout using Eagle or Circad with ViewMaster Gerber analysis**
- D) Documentation for construction, reference, safety authorities**

#### **4. Fabrication or modification of equipment:**

- A) Construction of equipment from existing schematics or drawings**
- B) General interconnection of electrical devices or objects**
- C) Modification of equipment to meet ESA safety standards**
- D) Functional testing and calibration of new, existing, or fabricated equipment**

5. **Documentation:**
  - A) **Creation of equipment manuals for operation or service**
  - B) **Mechanical CAD drawings using AutoCAD, SolidWorks**
6. **Equipment Repair:**
  - A) **General and specialized equipment maintenance and repair**
7. **Miscellaneous Services:**
  - A) **Interconnect cable construction**
  - B) **Electrical connection of small surface mount components**
  - C) **Procurement and sales of electronic parts and supplies**

**Examples of Fabricated Equipment:**

1. **Auto-zeroing microcontroller based wideband multi-channel strain gauge amplifier to existing remote data acquisition system**
2. **Power/ rpm meter with simultaneous display of voltage, current, power, and motor rpm. The unit incorporates dual high voltage isolation channels**
3. **Construction of a motor control panel, creation of schematics and wiring diagram for surgical robot**
4. **Conductivity meter with synchronized selectable multiple frequency sine wave current drive. The unit uses synchronous nature of waveform to perform sinusoidal averaging and detection for noise reduction**
5. **Microcontroller based dual channel high side current sensing module for high voltage current measurement. The digital SPI formatted data line is transmitted over a single fibre optic cable with the receiver reconstructing the word and clock lines. Being a battery driven module the sustaining voltage is related to length of the fibre and is considered capable of sensing to unknown levels of HV**
6. **Phase locked frequency generator to sustain high power resonance transducer for the purpose of levitating highly corrosive particles**
7. **Wide band, ultra high impedance sensor/ amplifier for use in brain voltage measurement in small animal medical research**
8. **Electrostatics based equipment such as field mills, relaxation time instruments, balanced current output HV generator research**
9. **Robotics modules employing accelerometers, stepper and DC motor drives, optical distance sensors**
10. **PC controllable soccer robot platforms with integral 2.4GHz communications transceivers**
11. **Dual processor autonomous micromouse robots with motor control feedback systems, auto-calibration multi-channel optical distance sensors, diagnostic 433 MHz RF transmission systems, integral maze search algorithm, fault protection networks, etc.**
12. **Transistor curve tracer with serial port computer controlled data acquisition system programmed in Visual C++**
13. **Heart rate monitor programmed in Visual C++ through on-board sound card**