Applied Electronics (3rd Year, 5th SEMESTER)

Credit value (ECTS) 3

Course category
Speciality (**Optional**)

Lecturer
Assist. prof. dr. ing. Radu DROSESCU

Discipline objectives (course and practical works)

The Applied Electronics course aims to transmit theoretical and practical concepts to future agronomists regarding the application of electronic devices and circuits in the control, operation, automation and optimization of agricultural installations and machines, to ensure an increase in operating efficiency, reduced energy consumption and increased efficiency..

In the practical works (labs) students are guided in execution of electronic assemblies used in the operation and automation of various agricultural facilities, as well as in their software programming.

Contents (syllabus)

Course (chapters/subchapters)
Basic concepts regarding semiconductor diode, bipolar transistor, field effect transistor and their usage in rectifiers, DC/DC converters, pulse generators, relays driving and DC or servo motors control.
Introducing analog and digital signals, Analog-to-digital and Digital-to-Analog Converters. Basic concepts regarding binary base, logic and arithmetic operations
Introducing to microcontrollers architecture. Explanation of digital inputs/outputs (I/O) analog inputs, programming technics for all those with direct applications to LED, Relays, Switches and other simple primary devices.
Serial communications, USART the simplest modality to data and information exchange between microcontrollers, or microcontroller and PC
Sensors. Description of operation, connection, control and reading of data from temperature, humidity, proximity, photoresistor sensors..
Programming ultrasonic sensors for distance measurement and their use in various applications
Presentation of the GPS receiver, its programming for taking over the coordinates and speed.
Ways of transmitting information between local IoT control systems using wireless (Wi-Fi) communications and Bluetooth
Design of a smart sensors network using multiple Arduino Nano IoT modules.
The brushless motor and its control using a three-phase inverter.
Using I2C and SPI serial communication system to connect various sensors or LCD modules, 7-segment displays, LED arrays using this type of interconnection,

Practicum
1. Presentation of the Arduino Uno experimental kit, installation of the integrated development environment for kit programming

2. Presentation of Fritzing software program for automatization of Arduino circuit editing and design
3. Using digital outputs applied to LEDs (normal and RGB) and 7-segment LED display
4. Programming digital inputs in applications for of switches and other sensors' status reading
5. Conversion of analog signals with applications to temperature, humidity and brightness sensors
6. LCD displays with parallel and serial control (I2C)
7. Final colloquium of knowledge evaluation

References

1. Radu Drosescu. –"Montaje electronice experimentale cu Kitul Arduino Uno", 2014 - format digital
2. Radu Drosescu – „Echipamentul Electric si Electronic al Autovehiculelor Rutiere", Editura Pim. Iasi, 2010.
3. Radu Roşca si colab.-Combustibili neconvenţionali pentru motoare cu ardere internă.Edit.Gh. Asachi Iaşi, 2002.
4. Neil Cameron. – Aplicații cu Arduino-Proiecte complexe pentru electronica, Editura APress, 2019.
5. . Stefanescu C., Cupcea N., Electronica Aplicata, Bucuresti 2003.

Evaluare finală

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Presence and active participation	10%
Practical training	Presence and active participation	30%
Colloquim	Written examination	60%

Contact person

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