Projektförslag för kandidatarbete inom Elektroteknik (E2) EENX15:

Use of Lego Robots for Measuring Surface Potential on Insulating Materials

Bakgrund

The reliability of components of HVDC energy systems is defined by proper high voltage insulation. For designing insulation systems, detailed knowledge about properties (electrical, thermal, mechanical, etc.) of the constituting materials is required. In particular, the ability of materials to accumulate and dissipate surface charges is one of the most important characteristics of HVDC insulation due to its specific operation conditions. Information about dynamics of charges on air-solid interfaces is usually obtained from experiments by scanning pre-charged surface of a material sample by means of a surface potential (SP) probe coupled to an electrostatic voltmeter. The probe is moved along the surface by a positioning system, which provides its spatial coordinates. Such scanning is repeated with certain time interval to observe time variations of surface potentials and thus should be performed with the accuracy providing repetitive potential measurements in the same locations on sample surface. During the scan, the probe should be kept at certain distance (2-3 mm) from the charged surface that makes it difficult to provide accurate measurements if it is fixed on a long arm.

The aim of the projekt is to test the applicability of programmable Lego robot(s) as carrier(s) of the probes for measuring distributions of electrostatic potentials on charged insulation surfaces.

The project is nominated to ”Elkraftrådets kandidatarbetarpris”.

ELKRAFTRÅDET
vid Chalmers Tekniska Högskola

Problembeskrivning

- Reading a set of provided papers on fundamentals of SP measuring techniques.
- Selecting a proper Lego robot (examples are shown above), assembling the robot, learning the software, programming, testing the robot for the accuracy of spatial coordinates.
- Conducting conventional SP measurements on few pre-charged materials samples.
- Perform the same measurements using the robot and compare the results.
- Develop recommendations for using Lego robots in SP measuring systems.

Målgrupp: TKAUT, TKELT, TKTFY,

Gruppstorlek: 4-6

Antal grupper: 1

Förkunskapskrav: Fundamental knowledge of electric fields and control

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Projekt Rapport: Preferable in English.