

Plant electro-mechanics

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The Idea

We would like to further explore the applicability of the hardware we built for the plant electro-physiology project by further development of monitoring and data gathering capabilities of the shields, Image analysis, signal long time monitoring. As well as to couple the manipulators with a motor system web-application which can be used from desktop or mobile devices and of course fully open source.

Who We Are

Marielle Vigoroux – Biology and Bioinformatics (John Innes Centre- Norwich)

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Marco Aita – Theoretical Physics and electronics (Sainsbury Laboratory – University of Cambridge)

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Carlos A Lugo – Theoretical Physics and software development (EBI – Cambridge)

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Implementation

Using a batch of the Plant physiology shields which are already designed we will develop a coupler system to DACs which we will use as interfaces for input to outputs signals.

We do believe it is possible to achieve a good characterization of the action potentials on the cheap for a number of plants and by recent articles we believe this can be of use in a range of applications from pathway discovery to sensor and material development.

With the aid of a small IoT setup using Raspberry Pi boards to process data and communication and 3d printed motorized manipulators we will develop a control web application for monitoring and data gathering a generic set of experimental setups which we will carry out using *Aldrovanda*, *Marchantia*, *Venus Flytrap*, and *Mimosa* for mechanics and *Marchantia* for Calcium signalling.

We will use the funds mostly to acquire motors, driver boards and electronic components, storage devices and for plant maintenance, acquisition and growth.

Benefits and outcomes

As a continuation of the previous round grant, we propose to take the project to the next level to produce a set of tools which can be used in a laboratory (We have always in mind school labs and the Bio-makespace project)

The outreach activities carried out by the team in the previous term proved to be extremely popular amongst children and researchers alike. We however were always showing work in progress, we

would like to round up all the loose ends which were emerging as the project was developed and actually aspire to culminate with a publication involving people from Norwich, Cambridge and now EBI, alongside the project's website and github repositories.

We have approached people from Enrico Cohen's lab and Dale Sanders lab both at JIC in Norwich for collaboration in the experimental side, also the work carried out will directly contribute to SLCU Braybrook's group scientific outcome.

Budget

We will spend

£ 500 plants (acquisition and maintenance)

£ 1000 electronics

£ 500 linear actuators, internet switches and storage devices

£ 500 travel costs Norwich-Cambridge.

£ 1000 3d printer Norwich side