

M.Sc. and Ph.D. projects:

1. IMPLEMENTATION OF A NOVEL BIOREACTOR SYSTEM FOR HIGH YIELD PRODUCTION OF CLONAL PROPGAULES
 2. SIGNAL TRANSDUCTION PATHWAYS IN FLUID SHEAR STRESS
 3. A SYSTEMS BIOLOGY APPROACH TO SIGNAL TRANSDUCTION PATHWAYS. MODELLING OF FLUID INDUCED SHEAR STRESS RESPONSES
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Project Background:

Large scale production of high value plants for agricultural applications, within forestry, for biofuel production, ornamental purposes, or for molecular pharming within the pharmaceutical sector, relies on production of clonal propagules from selected superior genotypes. We have designed an optimized bioreactor system based on fluid dynamics principles that allow for industrial scale production of microbes, plant propagules and mammalian cells. Parallel research on signaling pathways involved in the cellular fluid shear stress response is conducted in a microfluidics device utilizing molecular and biochemical techniques. Image analysis software has been developed for quantitative interpretation of biological data. Molecular scale modeling of the signal transduction pathways is used for testing hypothesis and support long term development of an efficient bioreactor system.

Institutional Background: The current project are part of a cross disciplinary effort at Georgia Institute of Technology (<http://www.gatech.edu/>) between Institute of Paper Science and Technology at Georgia Tech (<http://www.ipst.gatech.edu/>), School of Mechanical Engineering (<http://www.me.gatech.edu/>) and School of Biology (<http://www.biology.gatech.edu/>).

Techniques:

Mechanical.	Biological techniques	Programming	Systems biology
<ul style="list-style-type: none">- Particle Image Velocimetry (PIV)- computational fluid dynamics (CFD)- lattice-Boltzmann Method (LBM)	<ul style="list-style-type: none">- cell culture- gene expression analysis- biochemical characterizations	<ul style="list-style-type: none">- quantification of biological data	<ul style="list-style-type: none">- develop model for linking biological-biochemical – biophysical data

To learn more about the specific projects in this area, contact:

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