Eco-Switch
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INTRODUCTION
Our project aim is to design an E.coli system that is sensitive to multiple wavelengths of light and hence produces a colour indication for each corresponding wavelength it is exposed to. Through careful manipulation of the system, and a variety of fluorescent proteins, we believe we can achieve our goal. This system can become a powerful biosensor and multicoloured biological printer. We started with the transformed E.coli strain which responds to red light in the Levskaya et al (2005). We characterised the initial system through experiments and we created computational models to verify our findings.

THE INITIAL SYSTEM
Figure 1. Explains how the transformed strain works.
Progressing intensity of red light shown on the initial system will cause lower rate of autophosphorylation. The amount of transcription and translation of the OmpC promoter gene and LacZ reporter gene is dependent upon the amount of phosphate transfer. Lac Z catalyses the substrate 5-gal to form visible black precipitate which gives us an indication of whether the system is active or not.

THE MODEL
Transforming Figure 1 to control blocks, gives rise to Figure 2; each block was modelled based on ODE’s.
Simulating model: Euler method was employed to each ODE’s; results were captured showing variation of EnvZ, OmpR, translation and transcription states [Figure 3].

EXPERIMENTAL DETAILS
Subject system to different wavelengths; red filter gives the best inhibition. Then we subjected our system under different intensity of red light and characterise the system. Results are shown in Figure 4.

IMPLEMENTATION AND FURTHER WORK

ACKNOWLEDGEMENTS

REFERENCES
2. Eric Batchelor and Mark Goulton. Robustness and the cycle of phosphorylation and dephosphorylation in a two-component regulatory system PNAS January 21, 2003 vol. 100 no. 2 691-696.