Engineering a Smart Mushroom Growing System for Sustainable Nutrition

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Nutritious mushrooms can be grown in an efficient and accessible manner by engineering and automating their ideal growing environment. Mushrooms can be a healthy and reliable food source, which can help provide a source of nourishment for anyone who enjoys eating mushrooms, as well as people who have nutritional insecurities. This project's engineering problem is to create an autonomous mushroom growing system in which the necessary conditions for growth will be monitored/controlled by an Arduino microcontroller. The Arduino is programmed to run a misting system to maintain high humidity levels, run a fan to provide fresh air, and control LEDs to encourage mushroom growth. This device is composed of a glass jar that sits in a 3D printed base, composed of two components: the top component has two holes that lead to separate chambers, allowing air and mist in and out of the system. A ring in the bottom securely holds the container from which the mushrooms grow. The bottom component is divided into three sections: one houses the electronics, one houses the misting system, and the third section holds the exhaust fan. This prototype works successfully in functioning as designed, as all features are programmed to run autonomously; a phone app made with MIT App Inventor may also be used to run the system. The system is controlled by an Arduino which receives information from a humidity/temperature sensor and a real-time clock to control an ultrasonic mister, fans and LEDs. This creates an environment with the ideal conditions for optimal mushroom growth potential, allowing mushrooms to be grown efficiently and reliably. The mushrooms may be used as a source of nutrition and if implemented in areas with food insecurities, this prototype can be used to grow meat replacements.

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