WRO Junior Future Innovators

HOME FARMER

Project Report

Written By
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India

Picture 1 - Vihaan & Yogeshwar

ABOUT US

The Green Warriors, a duo of school students, are on a mission to revolutionize sustainable development through robotics. With a keen interest in environmental conservation, they're making innovative solutions that promise a greener future. These two young minds are tirelessly developing a sustainable robotics project, aiming to safeguard the environment and promote eco-friendly practices. Their dedication, creativity, and passion for sustainability make them a force to be reckoned with, embodying the spirit of youth-driven change in the quest for a more sustainable world.

VIHAAN

Loves Robotics, loves to create new things, and is also passionate about playing video games. Passion in coding makes him a code freak. He has made games on unity like Tic tac Toe with his coding skills and is planning to develop even more. Other than coding, he likes to do light research and read books, along with singing.

YOGESHWAR

Interested in building different structures. He prepares different designs like aircraft models. He is very mutch interested in Robotics and Electronics. He loves to create different projects. He has already prepared projects like security system, solar mobile charger, RC car, Robotics Arm .etc.

THE PROBLEMS

A Brief Description About the Current Scenario

The current scene regarding land pollution and soil infertility paints a concerning picture of environmental degradation. Rampant use of chemical fertilizers has led to soil degradation, reduced fertility, and contamination of groundwater. These practices not only harm the soil but also affect the quality and safety of our food supply. Excessive use of fertilizers contributes to nutrient imbalances in crops, leading to health issues like diabetes, cardiovascular diseases, and certain cancers in consumers. These adverse effects not only endanger public health but also hinder sustainable development by compromising the long-term viability of agricultural systems and ecosystems, emphasizing the urgent need for eco-friendly farming practices.

The Global Warming Effect

Global warming makes land pollution and soil problems worse. It changes rain and causes droughts or floods, harming soil. The heat also makes soil worse faster. This makes growing food harder and harms health and development. We need to act fast to fix this.

The Urban Challenge

The challenge of urban food production, where space constraints and busy lifestyles make traditional gardening difficult. This problem is significant due to the growing need for sustainability and self-sufficiency in food sources within urban environments.

THE SOLUTION

Problem Statement:

Our project, Farmer Bot, aims to address the pressing issues of soil degradation, land pollution, and the growing need for sustainable urban farming. These challenges are critical due to their impact on food security, environmental health, and sustainable development. Though home framing is recognized, few individuals engage in it, particularly upon realizing the negative impacts of regularly consuming chemically fertilized food. Our robotic solution aims to tackle this issue effectively and ensure sustainable life on land.

Why This Problem

We chose this problem because conventional farming practices often contribute to soil degradation and pollution through the heavy use of chemical fertilizers, pesticides, and intensive land cultivation. Urbanization further exacerbates these issues by reducing available arable land and increasing pollution levels.

Robotic Solution

Farmer Bot is a cutting-edge robotic solution designed to revolutionize farming practices. It is capable of autonomously planting seeds, nurturing crops, providing daily water requirements, and monitoring plant health. By incorporating sensors and sustainable farming techniques, Farmer Bot minimizes soil disturbance, optimizes resource usage, and reduces reliance on harmful chemicals. The solution also reduces the human efforts for farming and makes it easily available at home.

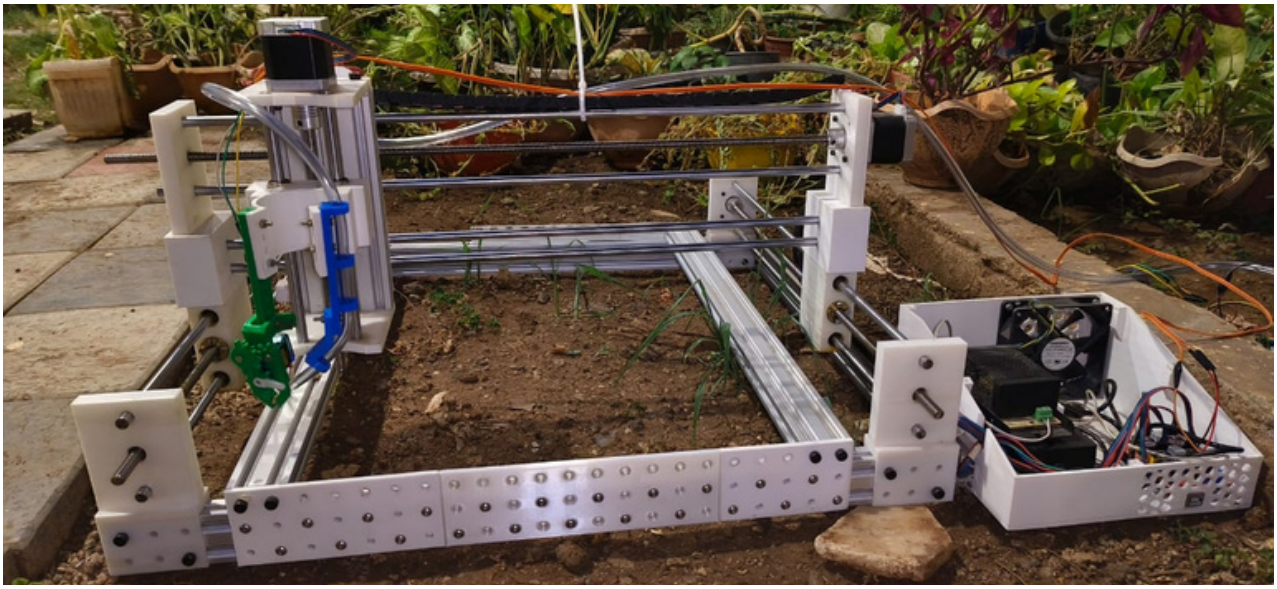
THE SOLUTION

Value of the Robotic Solution

The implementation of Farmer Bot in real-life scenarios offers immense value. It significantly reduces soil erosion, conserves water through precise irrigation, eliminates the need for chemical inputs, and promotes healthy plant growth. This not only improves crop yields but also enhances soil fertility and biodiversity. Furthermore, Farmer Bot enables efficient urban farming, making it possible to produce fresh, healthy food. By dedicating minimal time to farming, individuals can enjoy freshly grown plants without the use of fertilizers, all conveniently at their doorstep. This is achievable without disrupting their daily schedules, work commitments, or leisure time, thanks to our Farm bot.

Importance of the Project

Farmer Bot is crucial in addressing global challenges related to food production, environmental sustainability, and urban development. By promoting sustainable farming practices, reducing pollution, and conserving natural resources, our project contributes to building resilient agricultural systems and ensures a healthier future for both people and the planet.



Picture 1.2 - Home Farmer

HOME FARMER

Origins of the Idea: The concept of Farmer Bot emerged from our deep concern about the environmental impact of traditional farming methods and the challenges posed by urbanization on agricultural practices. We recognized the need for a sustainable solution that could address soil degradation, land pollution, and the growing demand for urban farming.

Although established farming techniques exist, it's surprising that home farming isn't more popular. This is especially concerning given the harmful effects of pesticides on daily consumed crops. To tackle this issue, we came up with a simple and cost-effective solution – introducing Farm Bot.

OUR MISSION

To empower individuals with the tools and knowledge to cultivate their own food at home, we harness accessible and innovative technology. Our aim is to foster sustainability and self-sufficiency, guiding individuals towards healthier lifestyles and environmental stewardship.

OVERVIEW

Our project revolves around the development of a Home Farming Robot, a sophisticated yet user-friendly system designed to enable individuals to grow their own food at home autonomously. Leveraging cutting-edge technology such as robotics, automation, and sensor integration, the Home Farming Robot streamlines the process of home gardening, making it accessible to people of all skill levels.

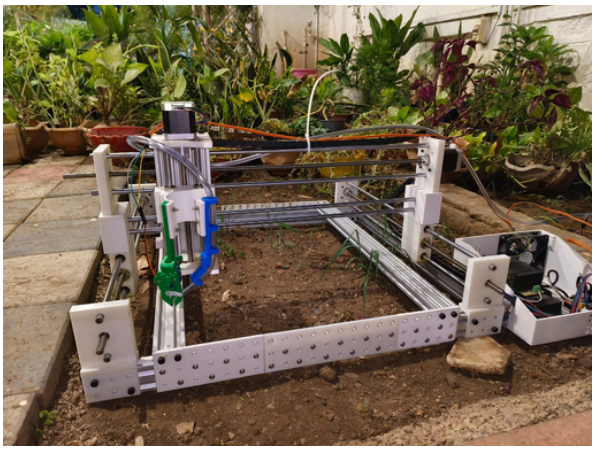
OUR JOURNEY

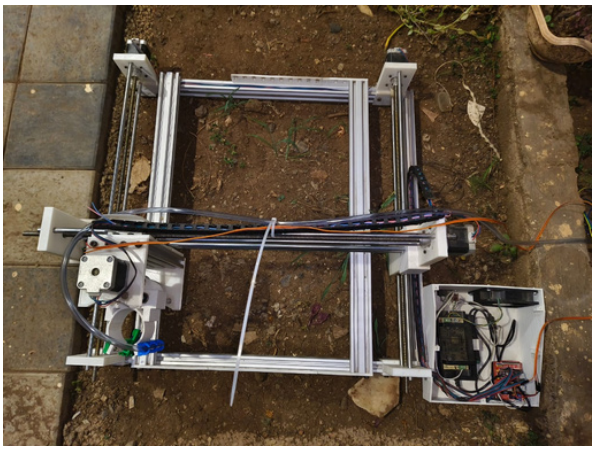
How we got the idea for our solution

When we found a pricey commercial farmbot used in big farms, we liked its features but couldn't afford it. So, we decided to make our own version which can be used in homes. We wanted something cheaper and easier for home use. By taking ideas from the expensive one and simplifying them, we aimed to create a friendly and affordable system for home farming.

Mechanical Construction

- 3D printed parts provide structural support and secure stepper motors.
- Steel bars maintain vertical balance.
- Lead screws enable movement.
- Allen nuts connect aluminum profiles to 3D printed parts.
- Linear bearings facilitate horizontal movement.
- Ball bearings reduce rotational friction.
- Couplers connect stepper motors to lead screws.
- Lead screw nuts connect 3D printed parts to lead screws.
- Aluminum profiles offer structural support.

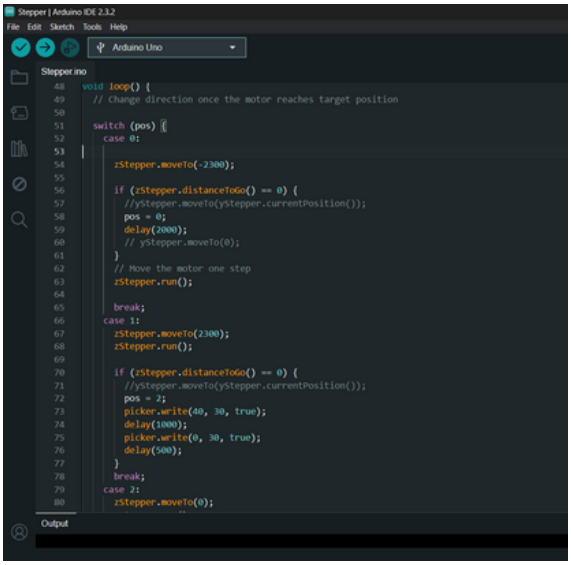


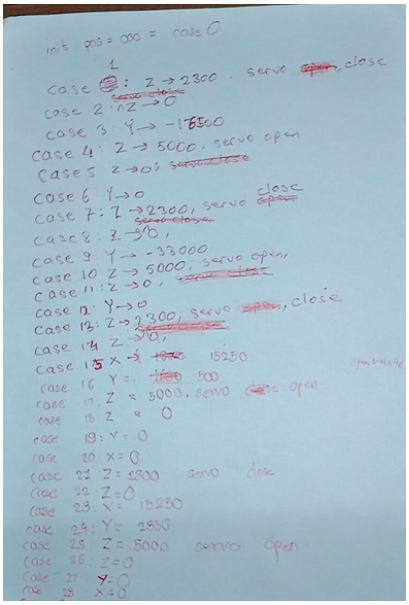


OUR JOURNEY

Coding of the Solution

The code automates movement with stepper motors and a servo, looping through predefined actions based on the variable "pos". It's part of a robotics or automation project, requiring precise motor control. Additionally, it features a 20x4 LCD for real-time updates on the bot's function and seeding recommendations, with a switch for instant plant watering. This indicates its integration into a formalized project, possibly in robotics or automation, demanding meticulous motor control for synchronized operations.





Scribble of initial code

Social Impact of the Product

The code automates movement with stepper motors and a servo, looping through predefined actions based on the variable "pos". It's part of a robotics or automation project, requiring precise motor control. Additionally, it features a 20x4 LCD for real-time updates on the bot's function and seeding recommendations, with a switch for instant plant watering. This indicates its integration into a formalized project, possibly in robotics or automation, demanding meticulous motor control for synchronized operations.

BUISNESS

Cost Structure

Our project involves careful consideration of the cost structure to ensure affordability for potential customers. We analyze the expenses associated with sourcing materials, manufacturing components, and assembling the Home Farming Robot by optimizing production processes and leveraging cost-effective materials.

Key Resources

Key resources for our project include skilled personnel with expertise in robotics, software development, and agriculture. Additionally, we rely on access to manufacturing facilities, equipment, and materials for prototyping and production.

Partners

Collaboration with farmers, and strategic leaders from farm equipment industries is essential for the success of our project. We seek partnerships with research institutions or universities can facilitate access to cutting-edge technologies and expertise, fostering innovation and product development.

LIST OF SOURCES

- https://lastminuteengineers.com/ds1307-rtc-arduino-tutorial/
- https://lastminuteengineers.com/arduino-1602-character-lcd-tutorial/
- https://www.youtube.com/watch?v=Hb6WJTX5X_E&pp=ygUSY25jIG1ha2luZyBtYWNoaW5l
- https://www.youtube.com/watch?v=uNkADHZStDE&pp=ygUIZmFybSBib3Q%3D
- https://www.youtube.com/watch?v=tkOhH9OUMto&pp=ygUVbGVhZCBzY3JldyBhcnJhbmdlbXRu
- https://www.youtube.com/watch?v=zUb8tiFCwmk&pp=ygUSY25jIGFyZHVpbm8gc2hpZWxk
- https://www.youtube.com/watch?v=JlhjcTh4yts&pp=ygUSY25jIGFyZHVpbm8gc2hpZWxk
- https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjfp7noz7eFAxUas1YBHR40BXkQFnoECBEQAQ&url=https%3A%2F%2Fwww.handsontec.com%2Fdataspecs%2Fcnc-3axis-shield.pdf&usg=AOvVaw2eTWlYBw_TEDD2ZzLp-D4L&opi=89978449
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- https://www.youtube.com/watch?v=eyqwLiowZiU&pp=ygUVc3RlcHBlciBtb3RvciB3b3JraW5n
- https://www.youtube.com/watch?v=5CmjB4WF5XA&pp=ygUac3RlcHBlciBtb3RvciBkcml2ZXIgYTQ5ODg%3D
- https://www.youtube.com/watch?v=BV-ouxhZamI&pp=ygUYc3RlcHBlciBtb3RvciBkcml2ZXIgZHJ2
- https://www.youtube.com/watch?v=rAIXfkRIQ5s&pp=ygUYc3RlcHBlciBtb3RvciBkcml2ZXIgZHJ2
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