
SMART GROW
GARDEN
SUSTAINABLE AGRICULTURE
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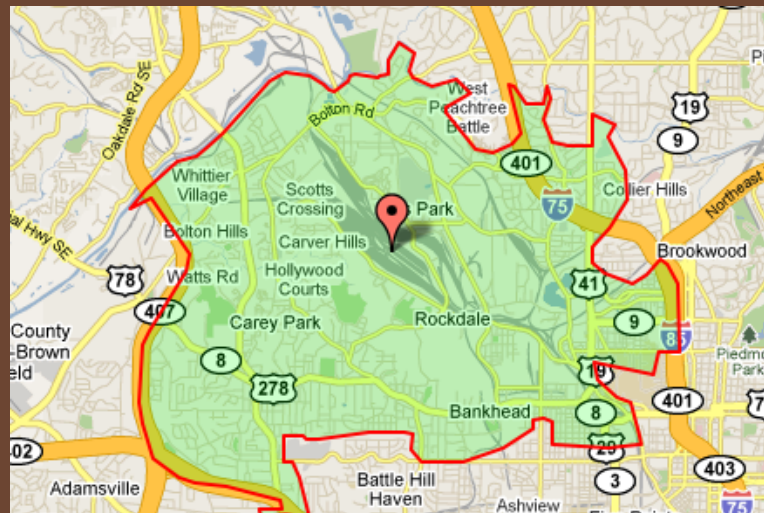
BIG IDEA & ESSENTIAL QUESTION

Big Idea: Sustainable Agriculture
UN Sustainability Goals: 2 (Zero Hunger), 11 (Sustainable Cities and Communities) 12 (Responsible Consumption and Production

Essential Question:
How can student-designed automated systems improve food production in urban communities?

THE PROBLEM

- The people who live in CSK's communities face limited access to fresh produce.
- Food deserts and rising food costs make healthy options harder to access.
- 7 Students investigated how technology could help grow food sustainably indoors.



PROJECT OVERVIEW

- Students designed and built an automated indoor garden.
- The system manages watering, lighting, and airflow.
- Students programmed the system using coding and engineering design principles.

ENGINEERING DESIGN PROCESS

1. Identify the problem: sustainable food production.
2. Research indoor farming and automation.
3. Design system components.
4. Build and code the automated system.
5. Test and improve the garden system.

TECHNOLOGY USED

- Raspberry Pi automation
- Student-written code
- Sensors for watering and environment control
- LED grow lights for plant growth
- Mechanical structures built by students

SYSTEM COMPONENTS

- Automated watering system
- Smart grow lighting
- Airflow circulation
- Plant monitoring
- Student-written control code
- Github

STUDENT LEARNING

- Coding and programming
- Engineering design process
- Systems thinking
- Sustainable agriculture concepts
- Data collection and testing

IMPACT

- Water conservation through automation
- Year-round indoor food production
- Hands-on STEAM learning
- Model for sustainable school agriculture

COMMUNITY CONNECTION

- Produce will support school programs and food initiatives, our Food Pantry.
- Students learn how technology can address real community challenges.
- Students will inform the comumunity on how they replicate this project at home

SCALING THE PROJECT

- Additional garden units
- Bottom tray to hold overflow water
- Expanded sensor systems
- Integration into engineering and science classes
- Cameras for automated tracking of plant growth and water leak monitoring

CONCLUSION

- Students used engineering and coding to create a sustainable indoor farming system.
- The project demonstrates how technology can help solve real-world problems.