THUNDER CORP. PRESENTS

ERIC, AHMAD, AL-WALEED, CHELSE

HEATED MATS

PROJECT SUMMARY AND OVERVIEW

PROBLEM STATEMENT

- A **modular**, **scalable** and **deployable** heated sidewalk is needed in order to replace the use of salt.
- This sidewalk should be **cost-efficient** and **durable** to combat the negatives of salt.

THE PROCESS

TURNING

USER NEEDS → *DESIGN CRITERIAS*

PRIORITY 1

USER NEEDS → *DESIGN CRITERIAS*

- Insuring safety → *Grips*
- Relatively low cost → *Ability to run on extreme conditions*
- Scalability → *Give off heat*

PRIORITY 2

USER NEEDS → *DESIGN CRITERIAS*

- Longevity → *Lasts at least 5 years*
- Relatively low cost → *Less than $100*
- Scalability → *Flexible sizing options + highly customizable*

PRIORITY 3

USER NEEDS → *DESIGN CRITERIAS*

- Energy Use → *Low energy consumption + turns off when there is no snow*

PRIORITY 4

USER NEEDS → *DESIGN CRITERIAS*

- Modularity → *Light weight*
- Maintainable → *Ease of assembly + easy clean*
- Ease of repair → *No need to interact with entire mechanism to repair*

PRIORITY 5

USER NEEDS → *DESIGN CRITERIAS*

- Environment friendly → *Does not cause harm to environment + safe materials*

DECISIONS

AFTER BENCHMARKING

SOLAR ROADWAYS

✗

SNOW MELTING CABLES

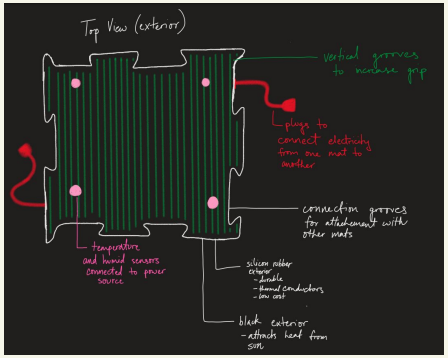
✗

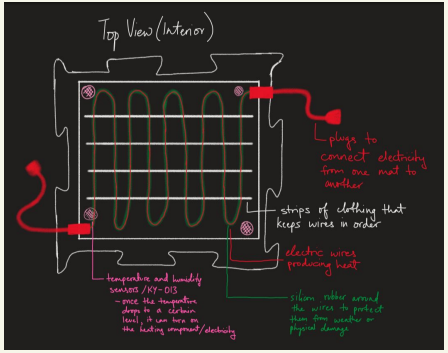
HEATED MATS

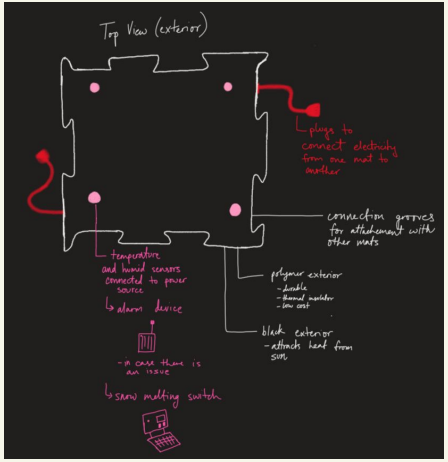
✓

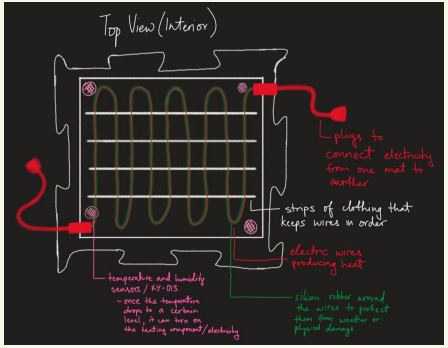
TURNING

GLOBAL CONCEPTS → *PROTOTYPES*


Top View (exterior)
vertical grooves to increase grip
plugs to connect electricity from one mat to another
connection grooves for attachment with other mats
temperature and humid sensors connected to power source
silicon rubber exterior
- durable
- thermal conductors
- low cost
black exterior
- attach heat from sun


Top View (Interior)
plugs to connect electricity from one mat to another
strips of clothing that keeps wires in order
electric wires producing heat
temperature and humidity sensors / KY-015
- once the temperature drops to a certain level, it can turn on the heating component/electricity
silicon rubber around the wires to protect them from weather or physical damage


Top View (exterior)
plugs to connect electricity from one mat to another
connection grooves for attachment with other mats
temperature and humid sensors connected to power source
alarm device
- in case there is an issue
snow melting switch
polymer exterior
- durable
- thermal insulator
- low cost
black exterior
- attach heat from sun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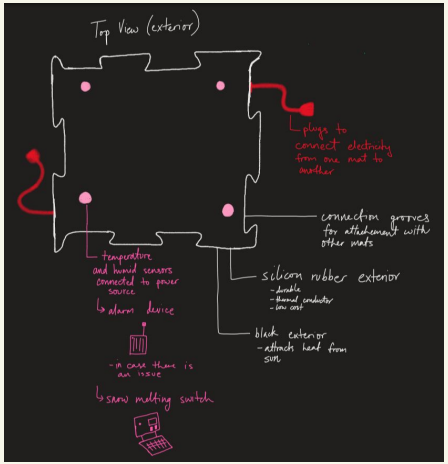
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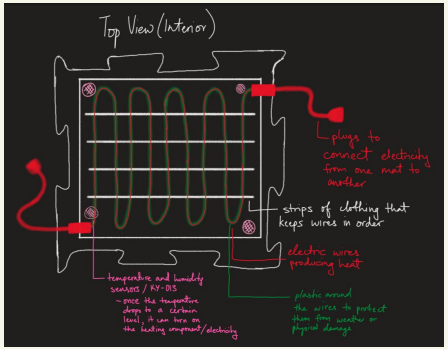
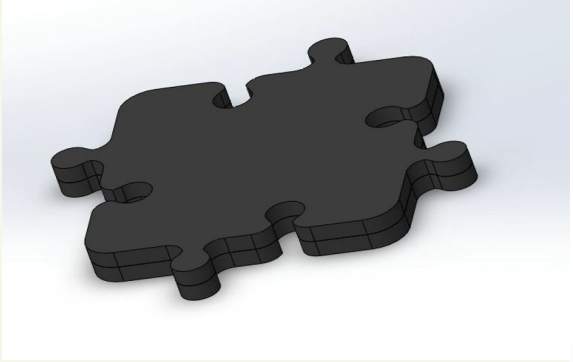
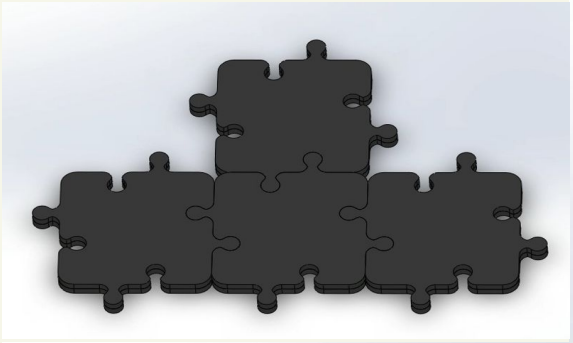
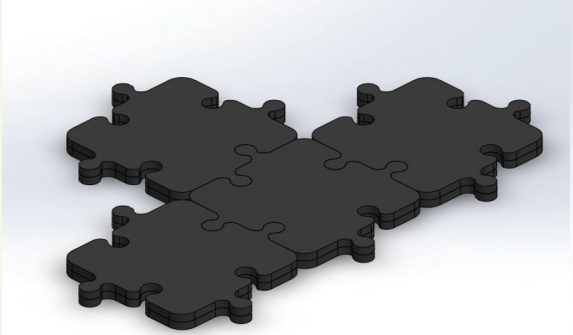
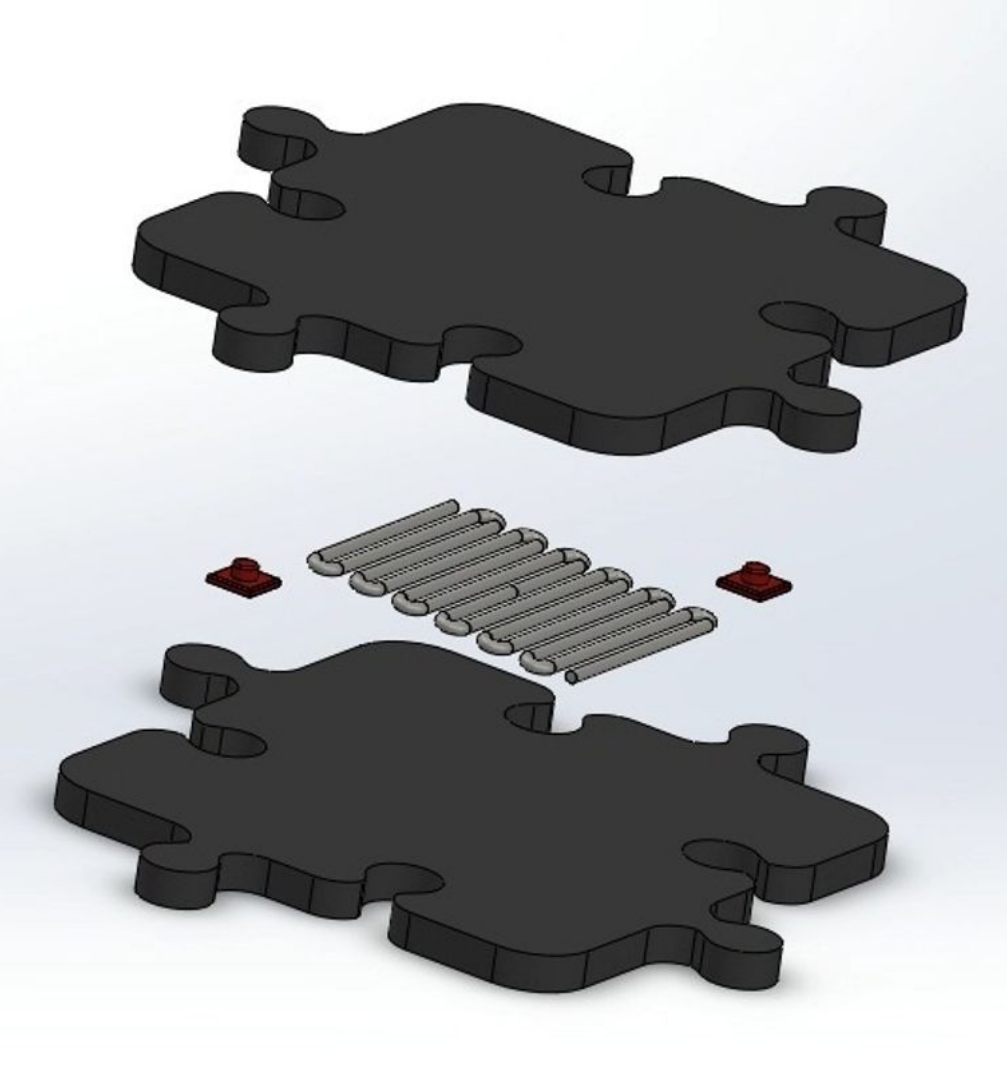

Top View (Interior)
plugs to connect electricity from one mat to another
strips of clothing that keeps wires in order
electric wires producing heat
temperature and humidity sensors / KY-015
- once the temperature drops to a certain level, it can turn on the heating component/electricity
plastic around the wires to protect them from weather or physical damage

PROTOTYPE 1









PROTOTYPE 2

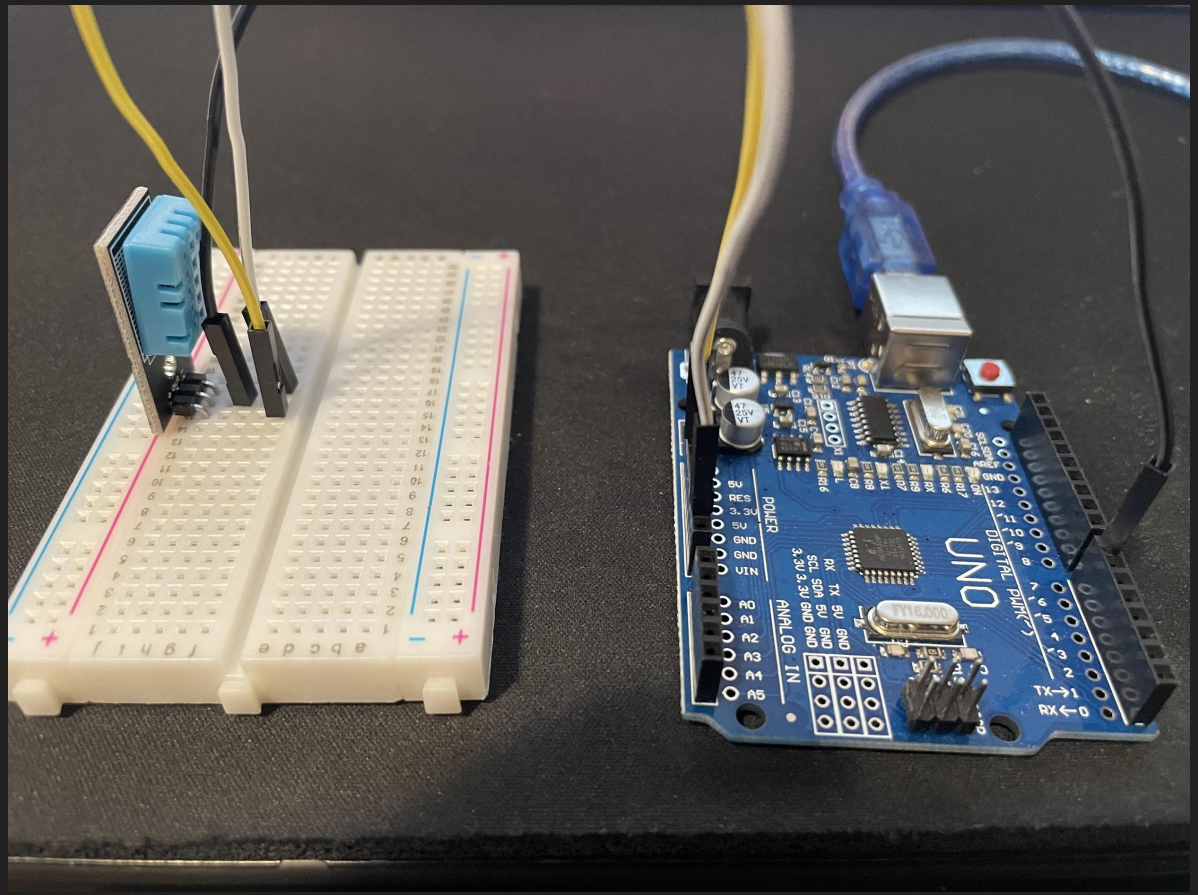
FINAL SOLUTION / PROTOTYPE 3:

THUNDER MATS

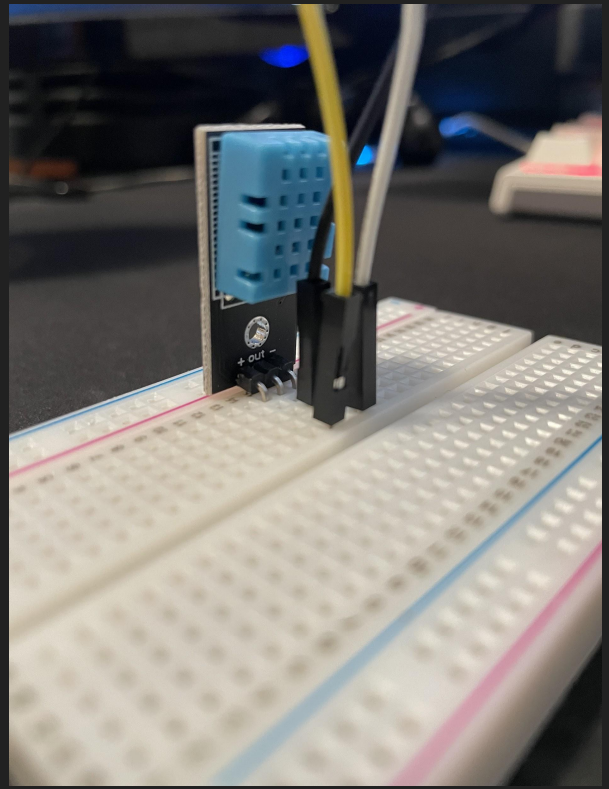
TOP 6 ADVANTAGES

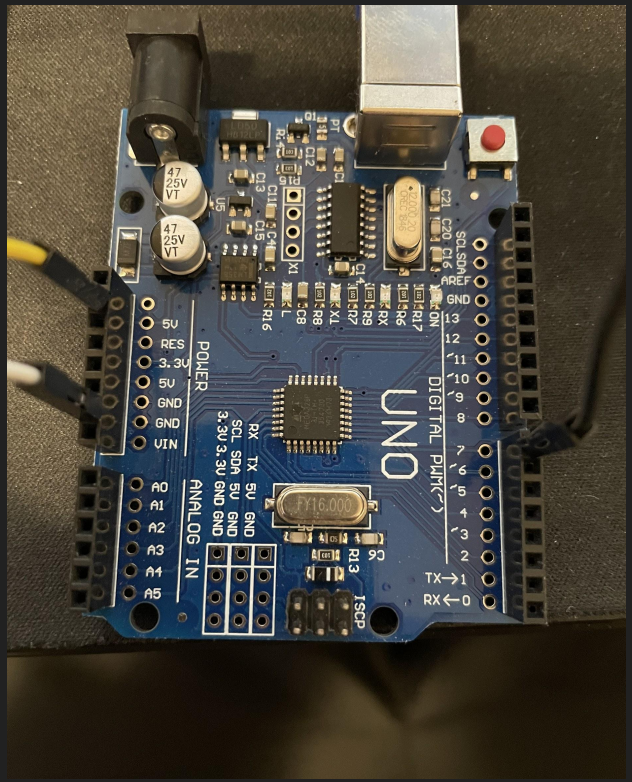
1. Keeps the sidewalks snow-free
2. Lightweight and modular
3. Customizable
4. Anti-slip
5. Material cost is under budget of $100 ($71.05)
6. Environment - friendly

ARDUINO AND TEMPERATURE HUMIDITY SENSOR

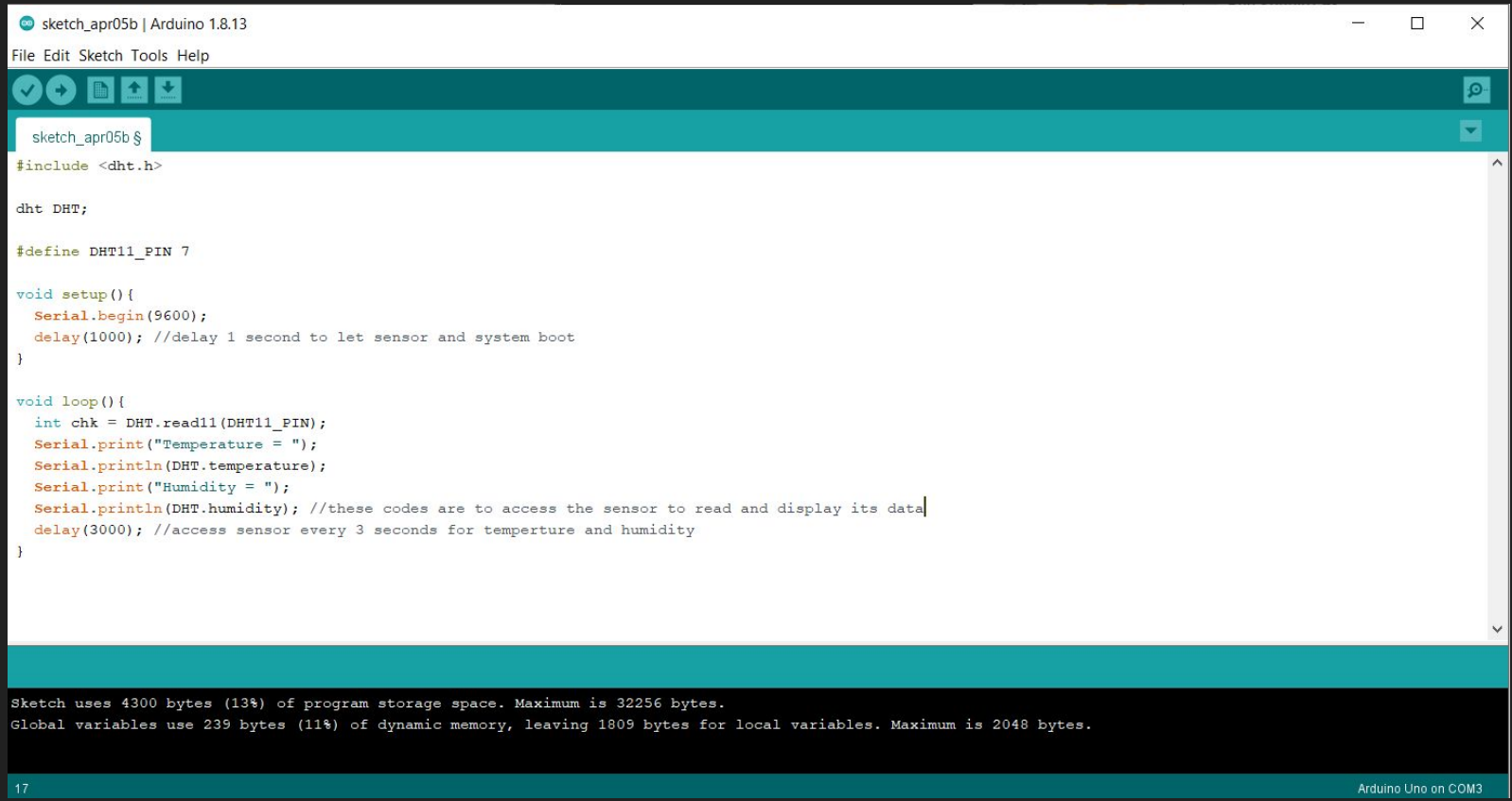


CLOSE-UP SHOTS

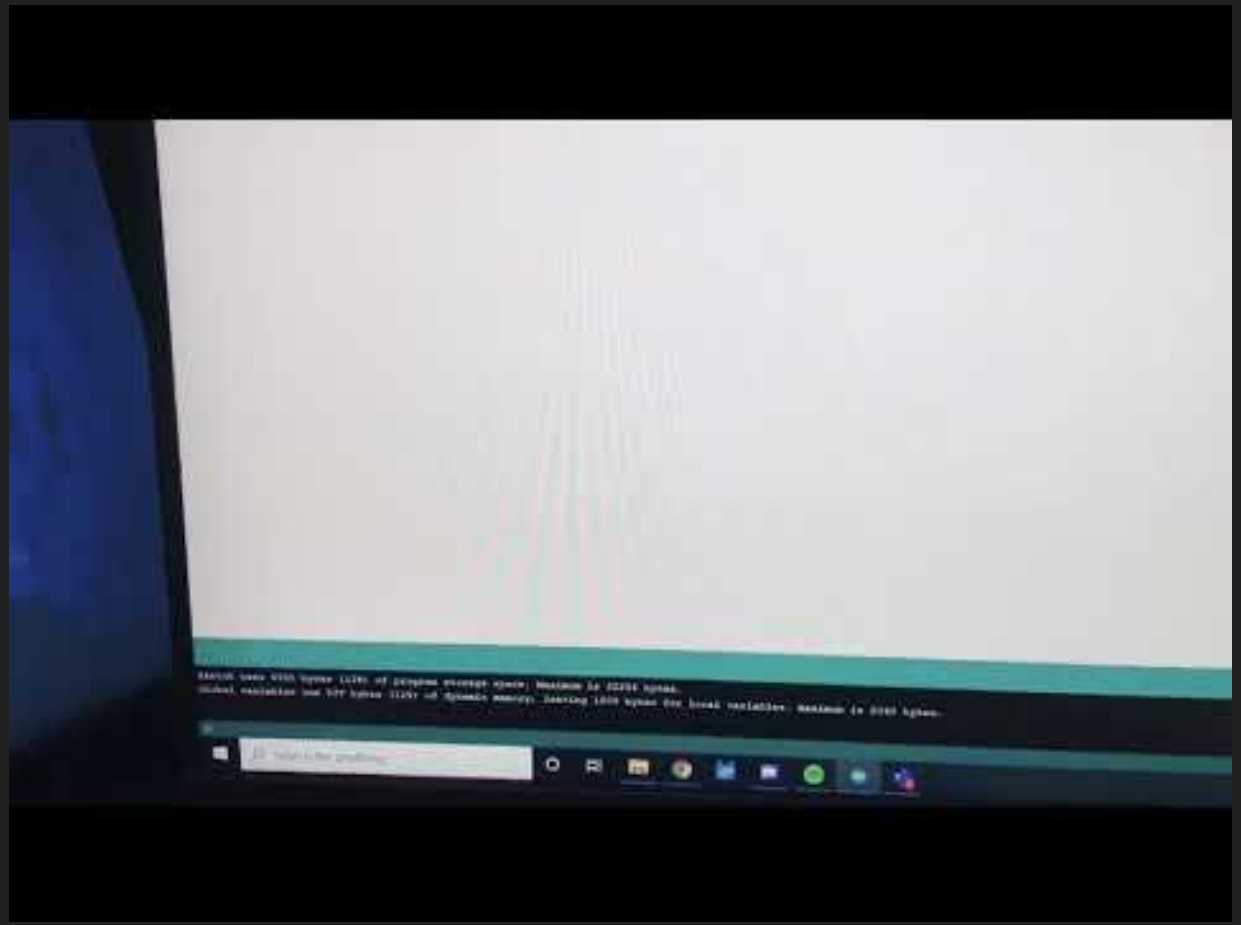




ARDUINO CODE



VIDEO OF SENSOR WORKING



VIDEO STAMP:
0.09 SEC = 5 MIN REAL TIME
0.18 SEC = 10 MIN REAL TIME

LESSONS LEARNED

TEAM IMPROVEMENTS

- Plan for future deliverables in advance
- Communicate each person’s tasks clearly
- Distribute tasks based on the strengths on each individual

PRODUCT IMPROVEMENTS

- Add lights to indicate if the mat is functioning
- Add extra grips to improve grips
- Add wifi or bluetooth based manual control

THANK YOU