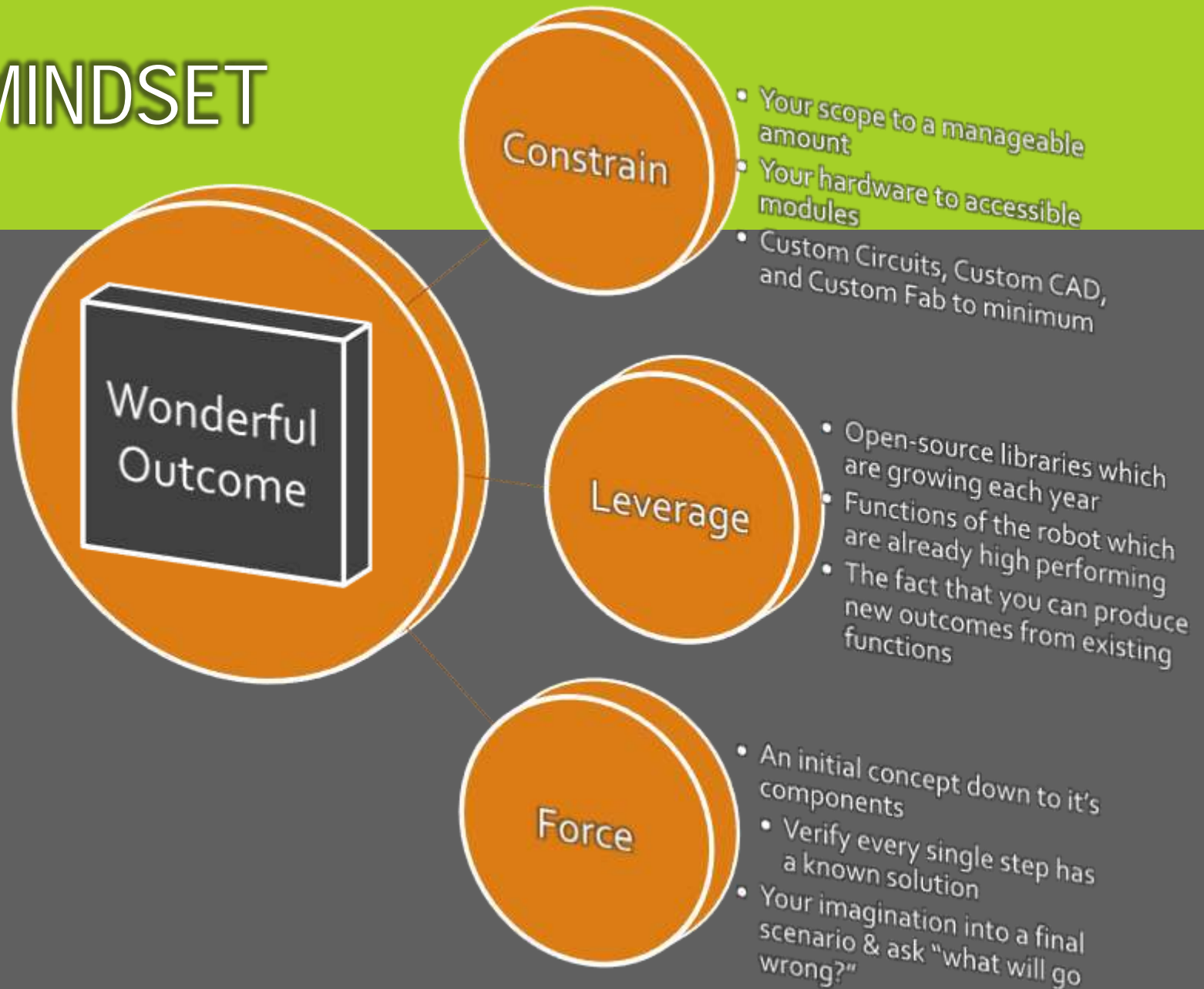# SCUTTLE
APPLICATIONS GUIDE

Last Revised 2020.10.07

Over 17 easy-to-approach project ideas

IDEATION MINDSET

Project ideation is not just a matter of creativity, it's a serious challenge in problem-solving and STRUCTURED brainstorming.

This skill takes years to develop. Here are some ideation guidelines that often make or break a final project demo.

Wonderful Outcome

Constrain
- Your scope to a manageable amount
- Your hardware to accessible modules
- Custom Circuits, Custom CAD, and Custom Fab to minimum

Leverage
- Open-source libraries which are growing each year
- Functions of the robot which are already high performing
- The fact that you can produce new outcomes from existing functions

Force
- An initial concept down to it's components
- Verify every single step has a known solution
- Your imagination into a final scenario & ask "what will go wrong?"

PROJECT TOPICS: HARDWARE BASED

Projects that require additional actuators

Feasible scope for MVP in less than 6 months

Limited to 1 or 2 actuators

Only actuators & sensors which have open-source libraries already

1.1 ENVIRONMENTAL SAMPLING (GREENHOUSE)

Environmental measuring – Identify containers and probe for temp/moisture/pH

Raft bed hydroponics nursery: These seedlings will benefit from monitoring of coloration and impacts from pests, or nutrient deficiencies.

1.2 SECURITY ROUTINE

Security tasks – take photos of designated items & upload.

1.3 3D PRINTER FILAMENT HANDLING

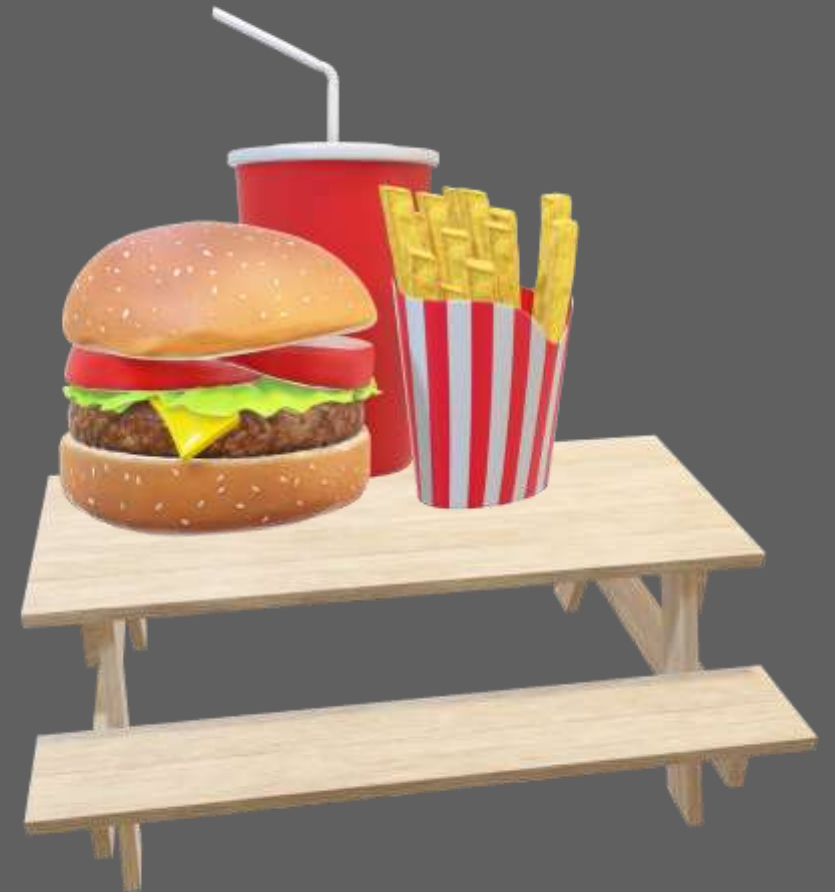Gather, transport, and load 3d filament spool onto hangers

 +

1.4 MOBILE REFRESHMENTS

Dispense purified water into cups where people need water.

1.5 RESTAURANT TABLE DELIVERY

Carry trays of food or supplies to designated location.

1.6 INVENTORY LABELING

- Add a portable label printer, identify boxes and label them with the proper information for shipping or contents

- https://www.searchingc.com.my/products/printpen

M-brush on amazon:
https://www.amazon.co.uk/Bluetooth-Printer-Portable-Cicarica-Anywhere/dp/B085VCRVS2

Youtube example: https://youtu.be/7Psmlwmv1fc

1.7 COLLECT TENNIS BALLS

- Cruise around the court

- Detect balls by color & shape

- Collect them in a basket

- Bring to a designated spot & dump

1.8 PET STORE MONITORING

- Look after the pet store on holidays to give alerts
  - For Dogs: detect barking in kennels
  - For Fish: detect dead fish, or sample water
    - pH
    - Temp
    - Salinity
    - Etc
  - For birds, reptiles, etc
    - Customize programs for irregular behavior
      - Sounds
      - Violent motion (movement rate)
   - Lack of motion or escape
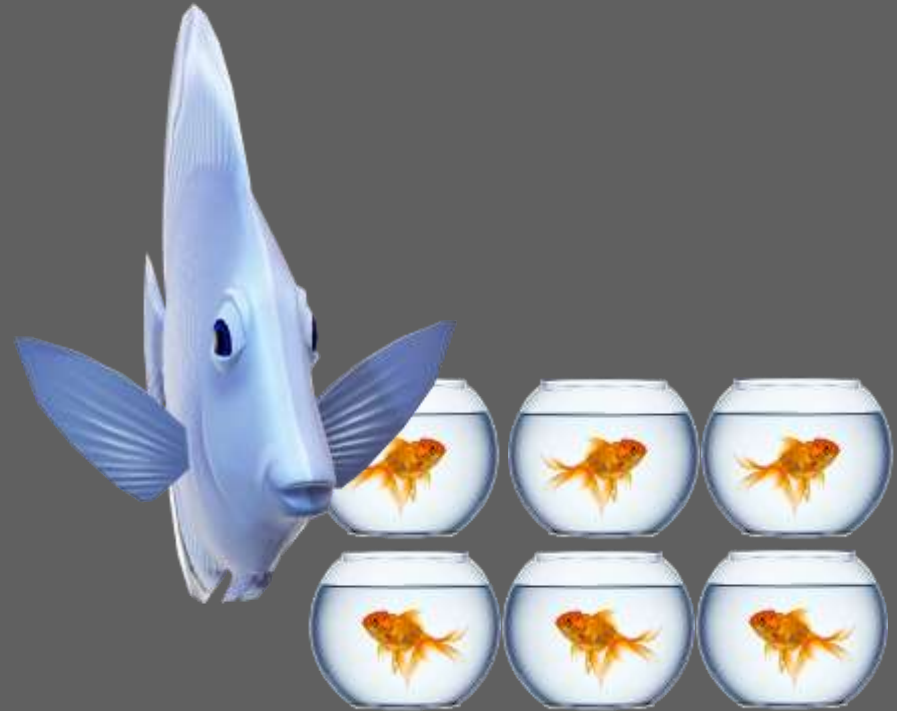
1.9 HAZARD REPORTING

- Detect hazards to humans in the pathway
  - Cracks in the sidewalk
  - Debris

- Take a photo onsite to show the condition

- Send the photo right away by cell carrier

- Use GPS coordinates to send a report with photograph to the department who will make a repair or send a technician out for inspection.

1.10 THERMAL FACILITY AUDIT

- Make a map of a building and take temperature measurements throughout

- Detect Windows & sources of airflow

- Use an air vane to detect airflow direction

- Generate a report on the indoor climate & areas of concern for heat buildup (cooling) and heat loss (heating)
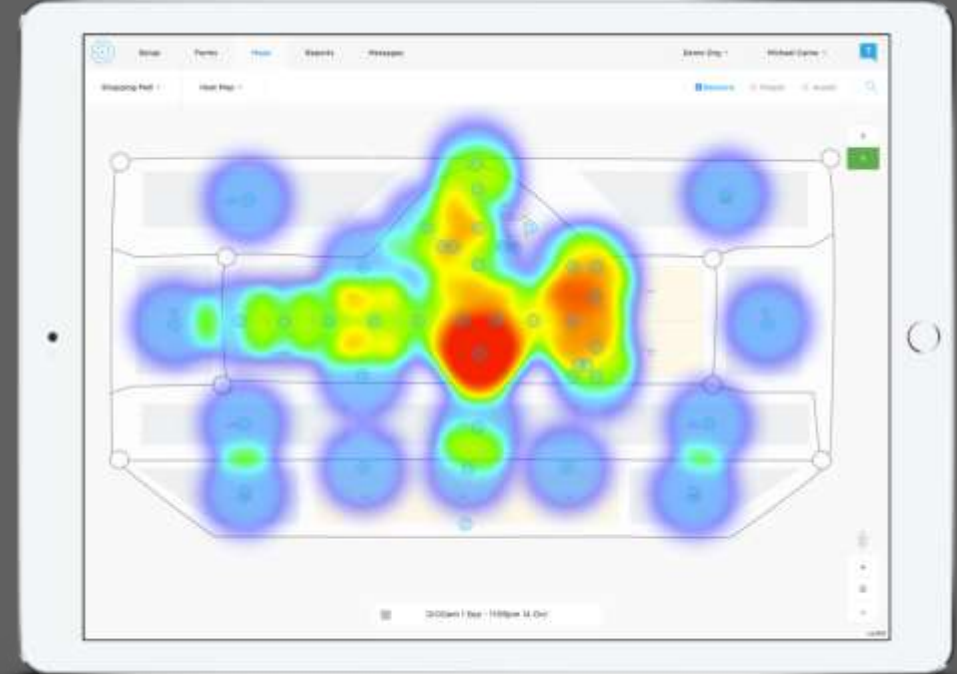
1.11 FIRE FIGHTING BOT

- Simple 2DOF arm for aiming a nozzle.

- Payload: secure 1 or more fire extinguishers

- Optional: use thermal imaging to detect fires.

Point Aim Spray Sweep (PASS)

PROJECT TOPICS: SOFTWARE BASED

Projects that do not require additional actuators

2.1 ENVIRONMENTAL MAP MAKER

- Use only the onboard navigation sensors (LIDAR and SONAR)
- Create a map of a room using LIDAR. Implement a remote-control driving and send a command to switch to automatic mode for exploring the room.
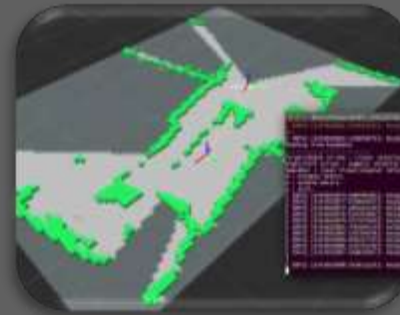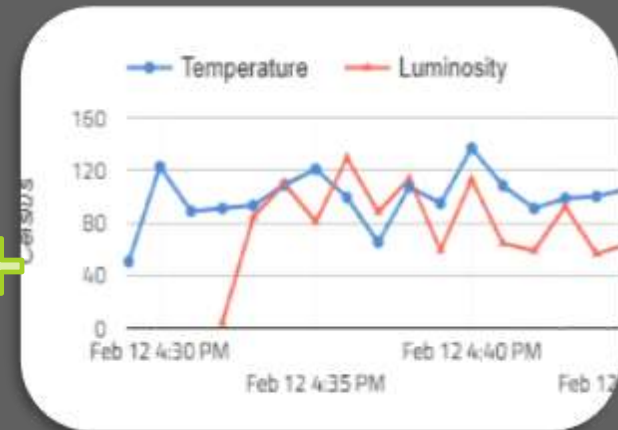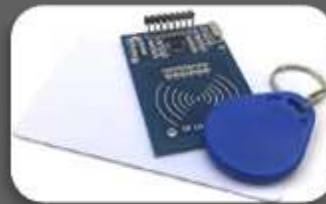
2.2 VISUAL TARGET DISCOVERY

Locate a visual target using machine vision. Collect data about the location of that object and report the data wirelessly.
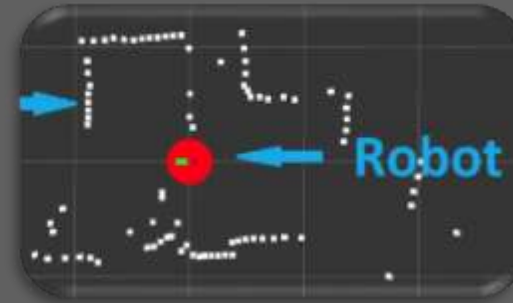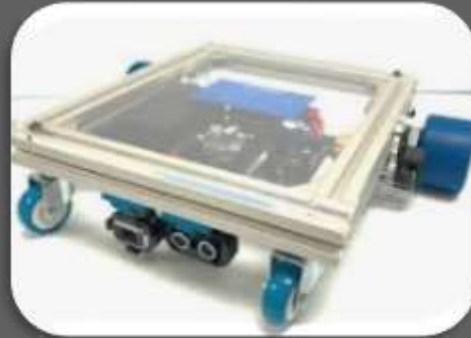
2.3 RFID & SENSOR PAIRING

Scan multiple RFID tags and report environmental readings to the IOT for each location.

2.4 PAYLOAD IOT WEIGHING SYSTEM

Locate the weight scale, measure the mass of the robot and exchange data with the scale as necessary to report the robot weight to the IOT

PROJECT TOPICS: FEATURE BASED

These projects add a feature, instead of a full behavior routine

3.1 COMPREHENSIVE TELEMETRY (SELF)

- Design a data structure to hold all major parameters of scuttles

- Design a data structure to carry these parameters for multiple scuttles in a fleet.

- Create a modular NodeRed dashboard with drag-and-drop functionality for new teams to gain awareness of their critical parameters while testing other tasks.

3.2 HOLOGRAPHIC DISPLAY

- Mount and integrate a hologram LED wand.

- Use the wand to display important metrics to users.

3.3 BATTERY CHARGING SYSTEM

- Option A: Wireless Charging
  - Create a station which is child-safe by adding wireless charging to a dock where SCUTTLE navigates to receive a recharge.

- Option B: Battery changeout station
  - Add more automation to the station itself and allow SCUTTLE's battery to be removed and subsequently replaced.
  - Design a modified battery pack which lends itself to quick recharge.