# SCUTTLE APPLICATIONS GUIDE
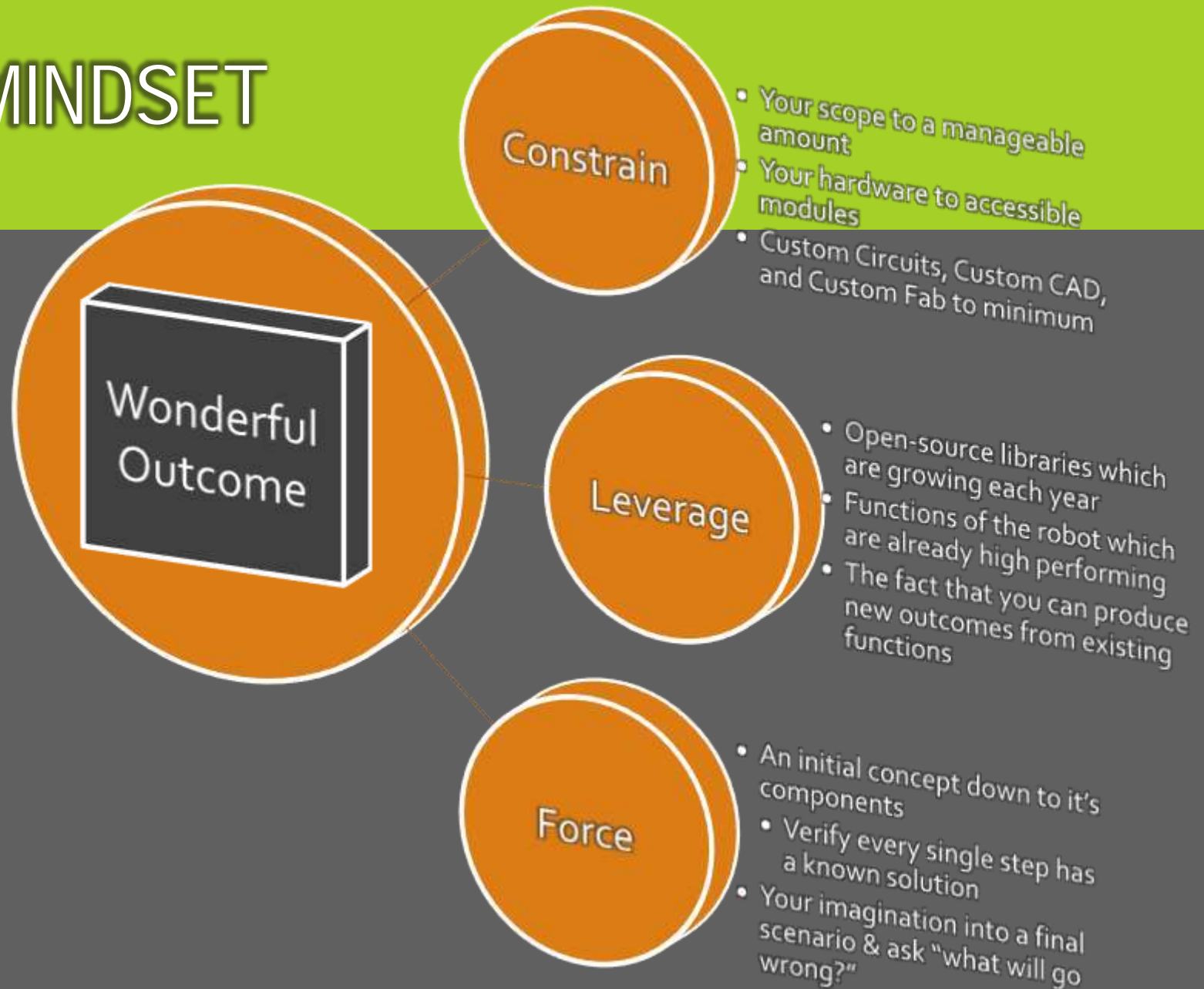
Last Revised 2020.09.18

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

# 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
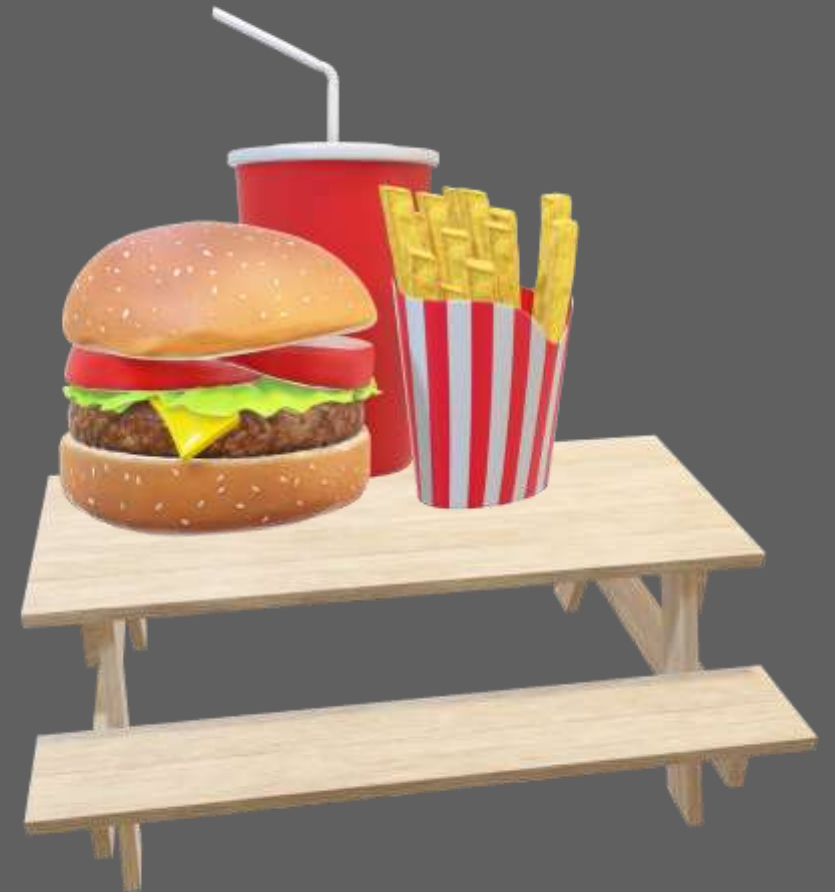
# 1.4  MOBILE  REFRESHMENTS

Dispense purified water into cups where people need water.

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# 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
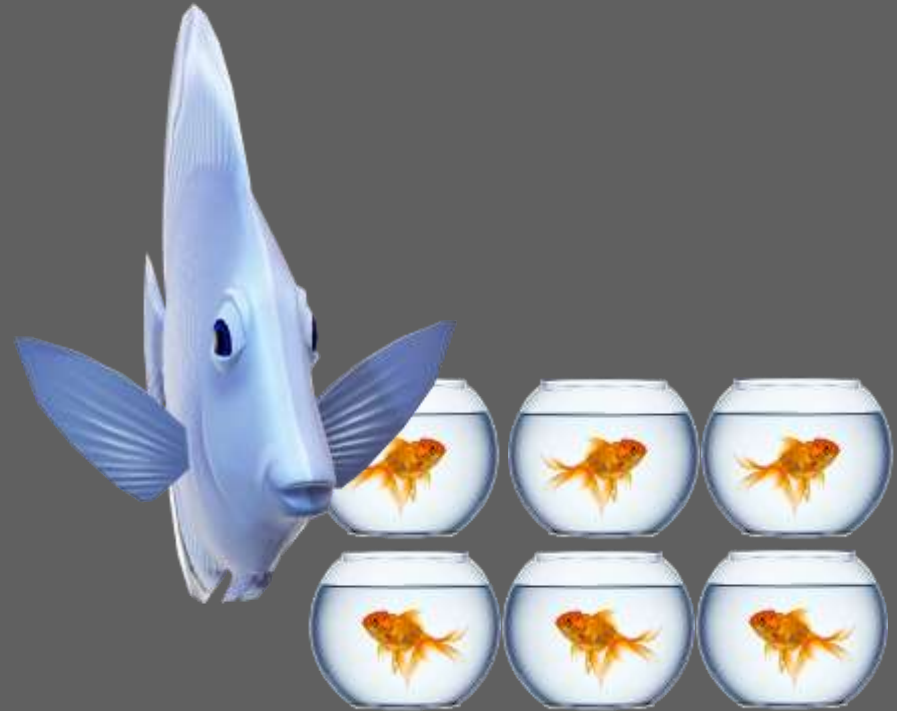
# 1.9 HAZARD REPORTING

- 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)
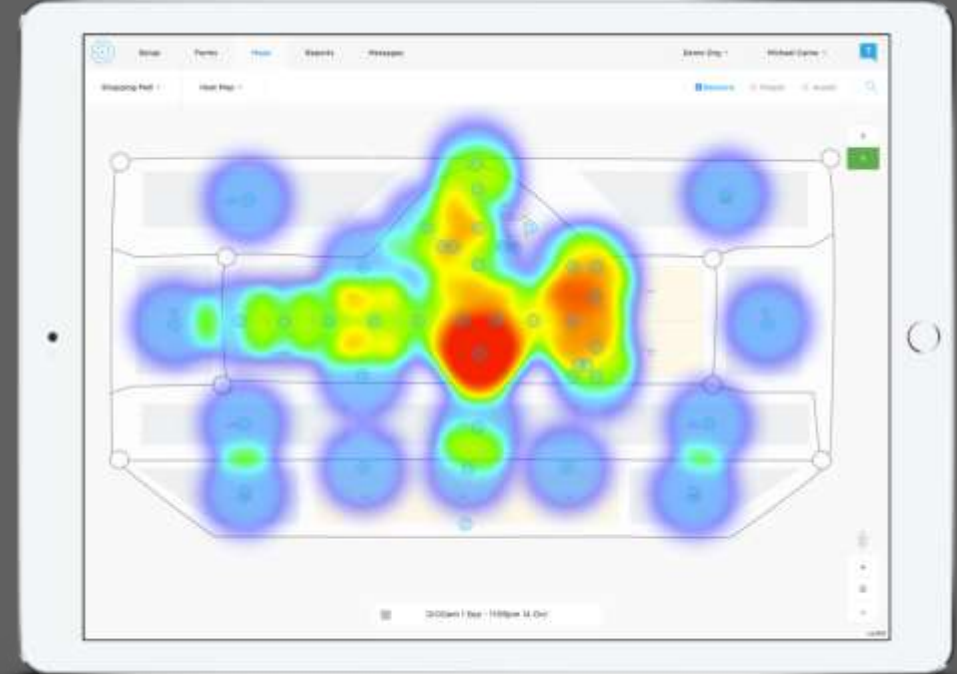
# 1.11 FIRE FIGHTING BOT

- 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.
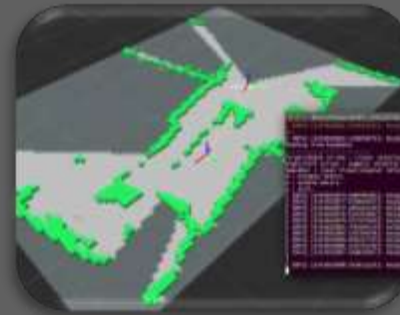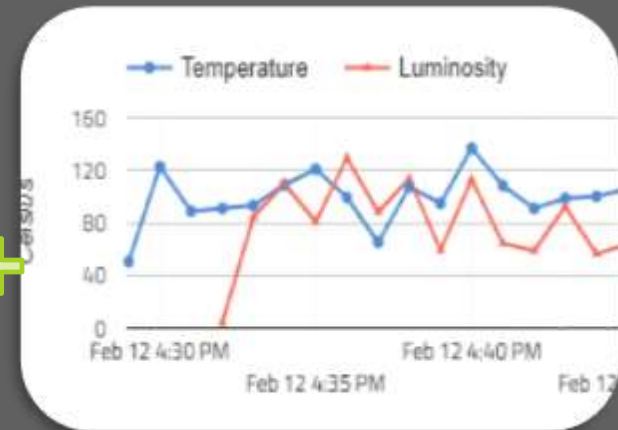
# 2.2 VISUAL TARGET DISCOVERY

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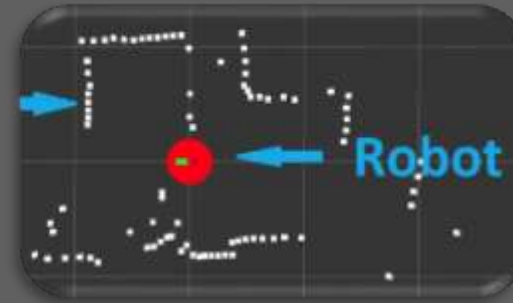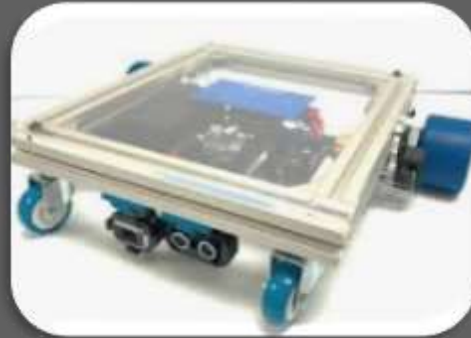
# 2.3  RFID  &  SENSOR  PAIRING

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.