Prototyping Interactive Systems DES 206

19-03-2024

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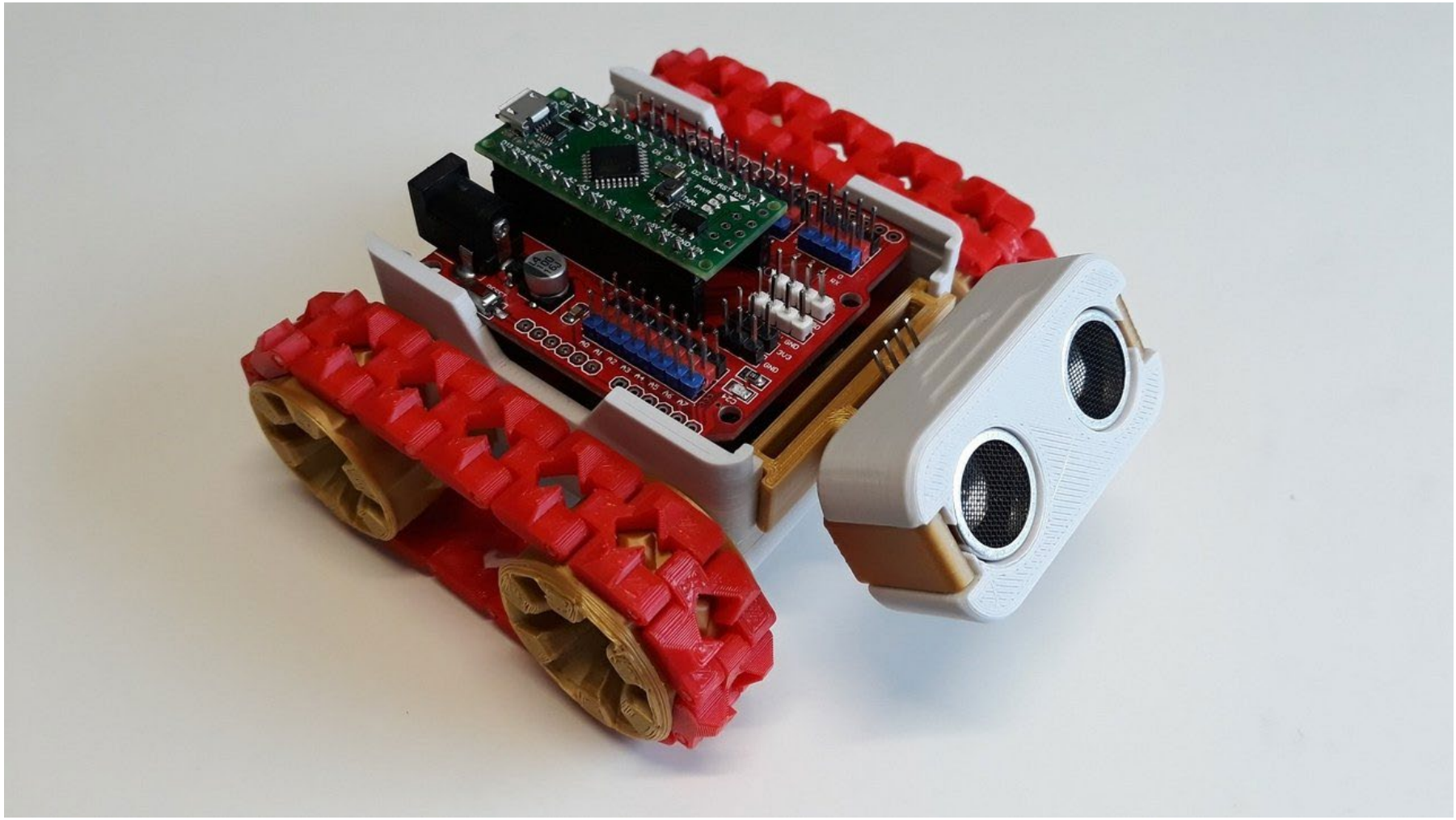
INFORMATION TECHNOLOGY
DELHI

Prototyping processes

Arduino for Interactive Prototyping



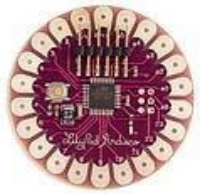
What is Arduino

- An open-source platform
- Based on an easy-to-use hardware and software
- A programmable microcontroller
- User friendly Development Environment (IDE)
- It was created for teaching electronics to artists and designers.
- Low cost (~ 400 INR)


Arduino Uno


Arduino Leonardo


Arduino Mega 2560


Arduino LilyPad


Arduino Mega ADK

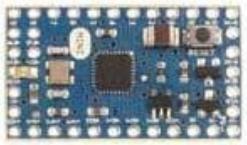

Arduino Fio


Arduino Ethernet


Arduino Pro


Arduino BT


Arduino Nano


Arduino Mini

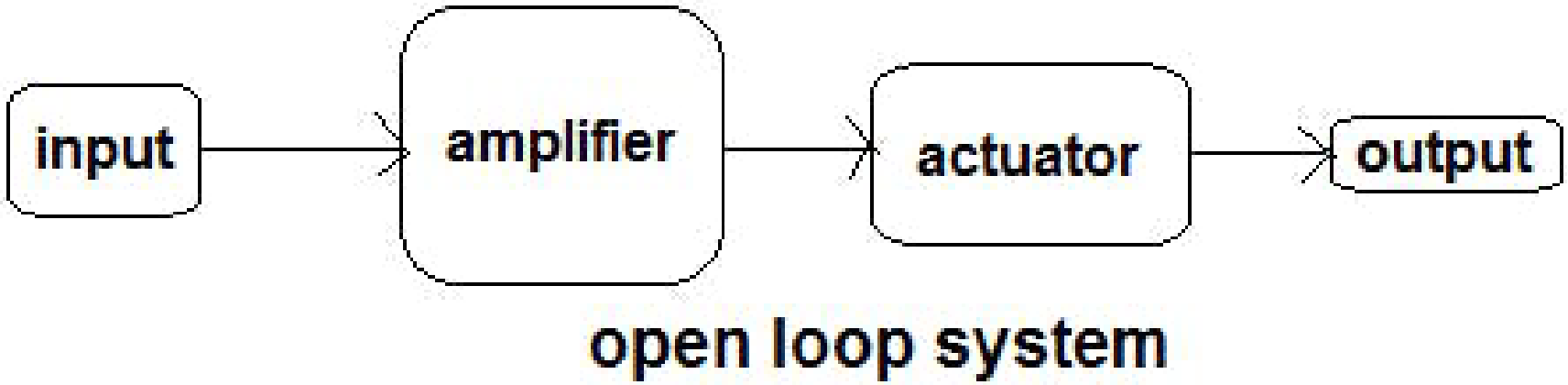

Arduino Pro Mini

Why use Arduino ?

- Low cost
- Easy to learn
- Comes with variety of compatible sensors
- Easy to use IDE and uses simple coding in C++
- Saves designers/students from the high cost and complexity of PCB design and printing

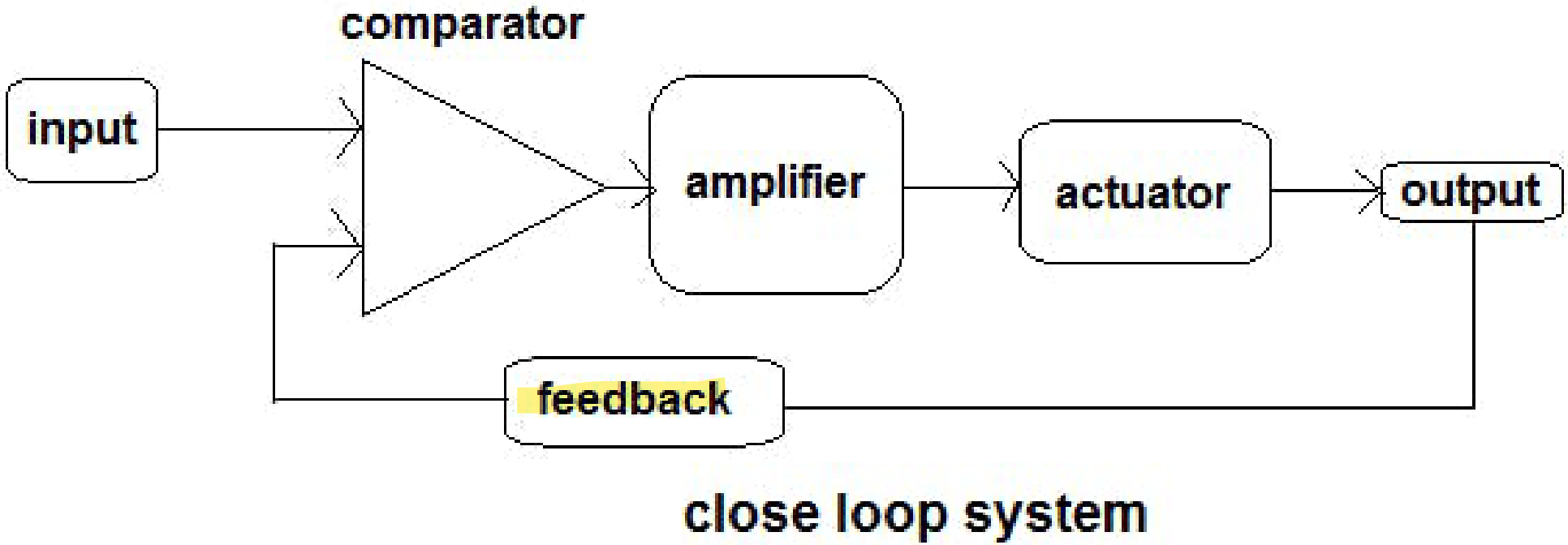
Underlying Theories

Open I/O Loop



open loop system

Closed I/O Loop



Logic

AND (&&)

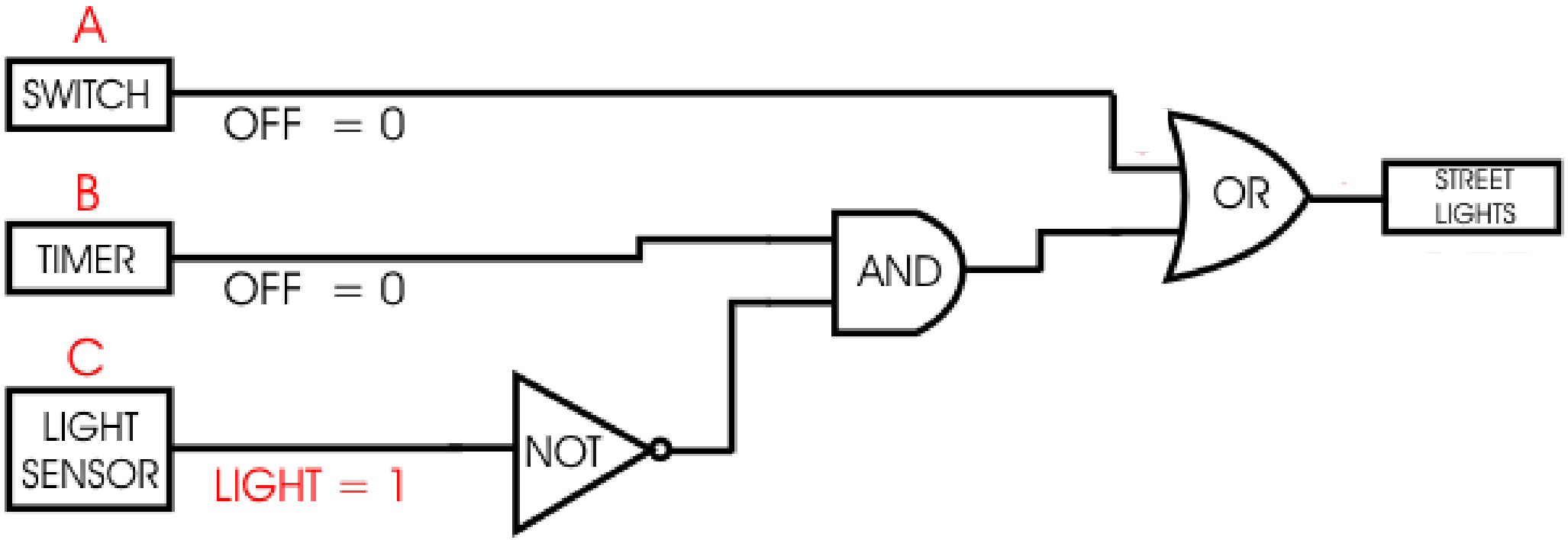
OR (||)

NOT (!)

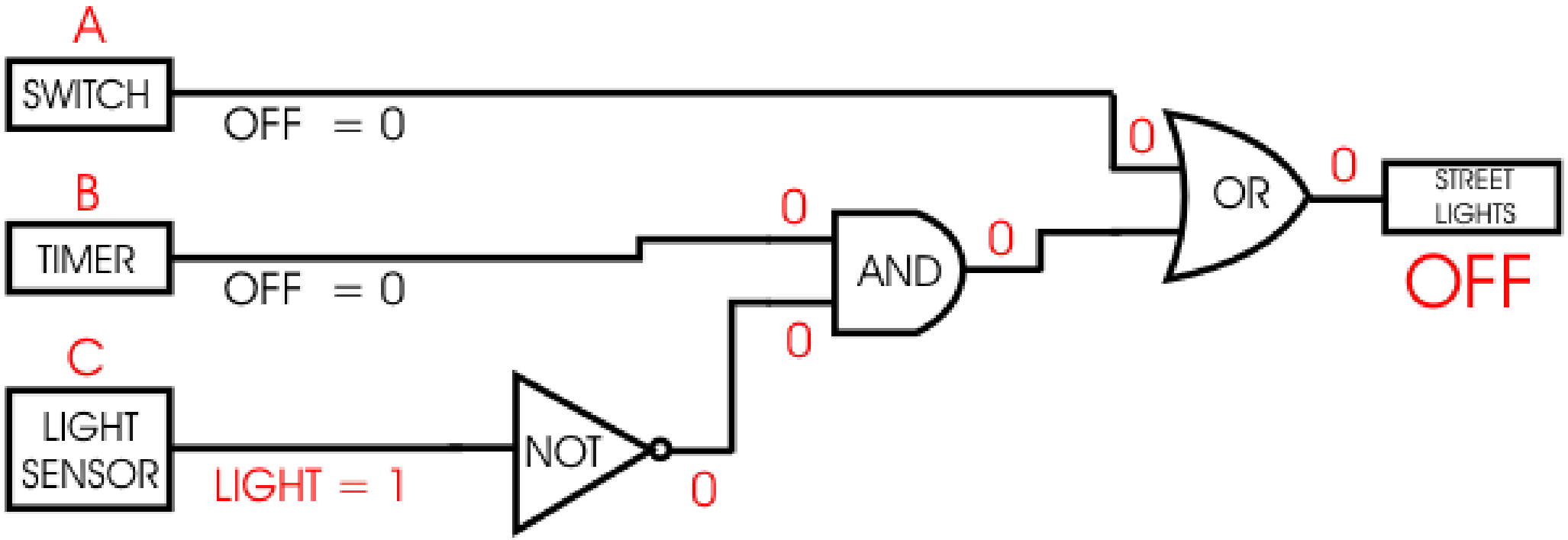
NAND

NOR

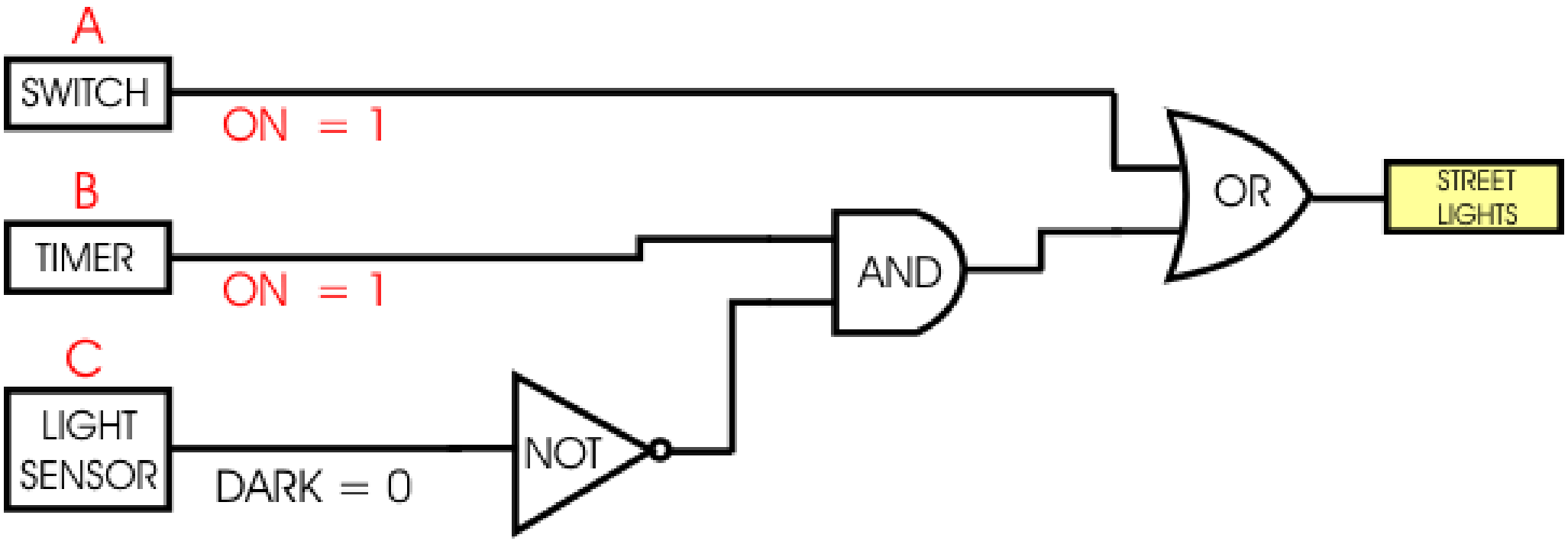
Logic – Automatic Street Light



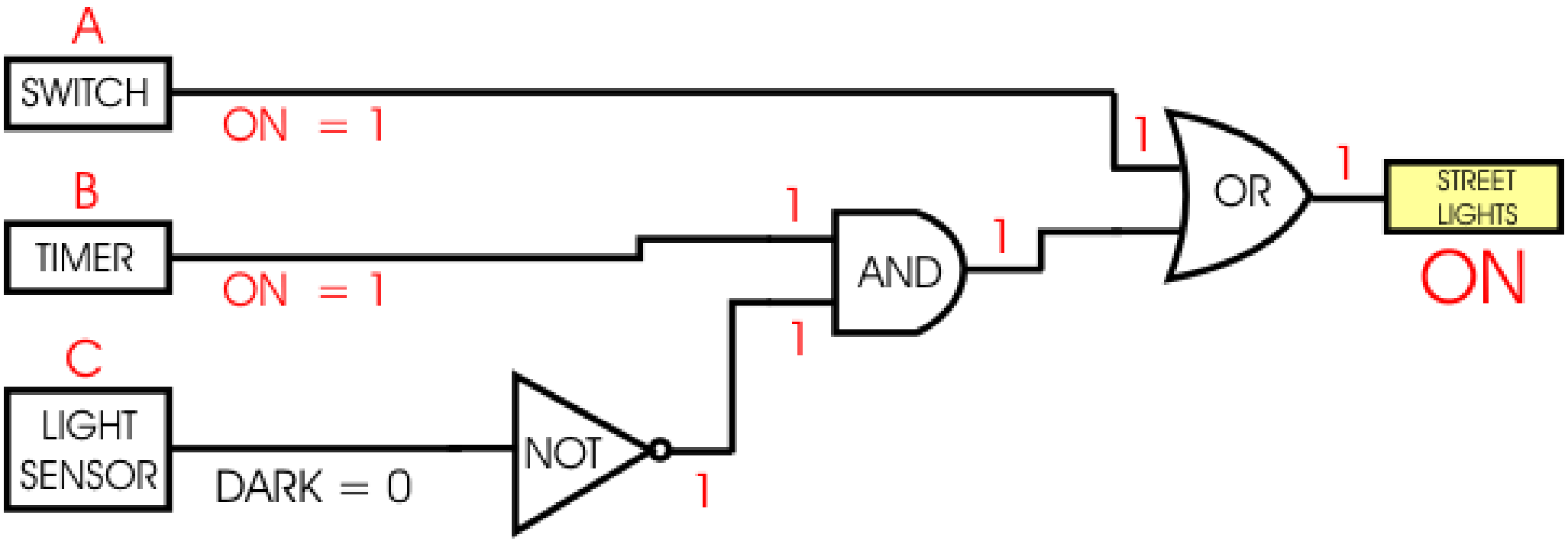
Logic – Automatic Street Light



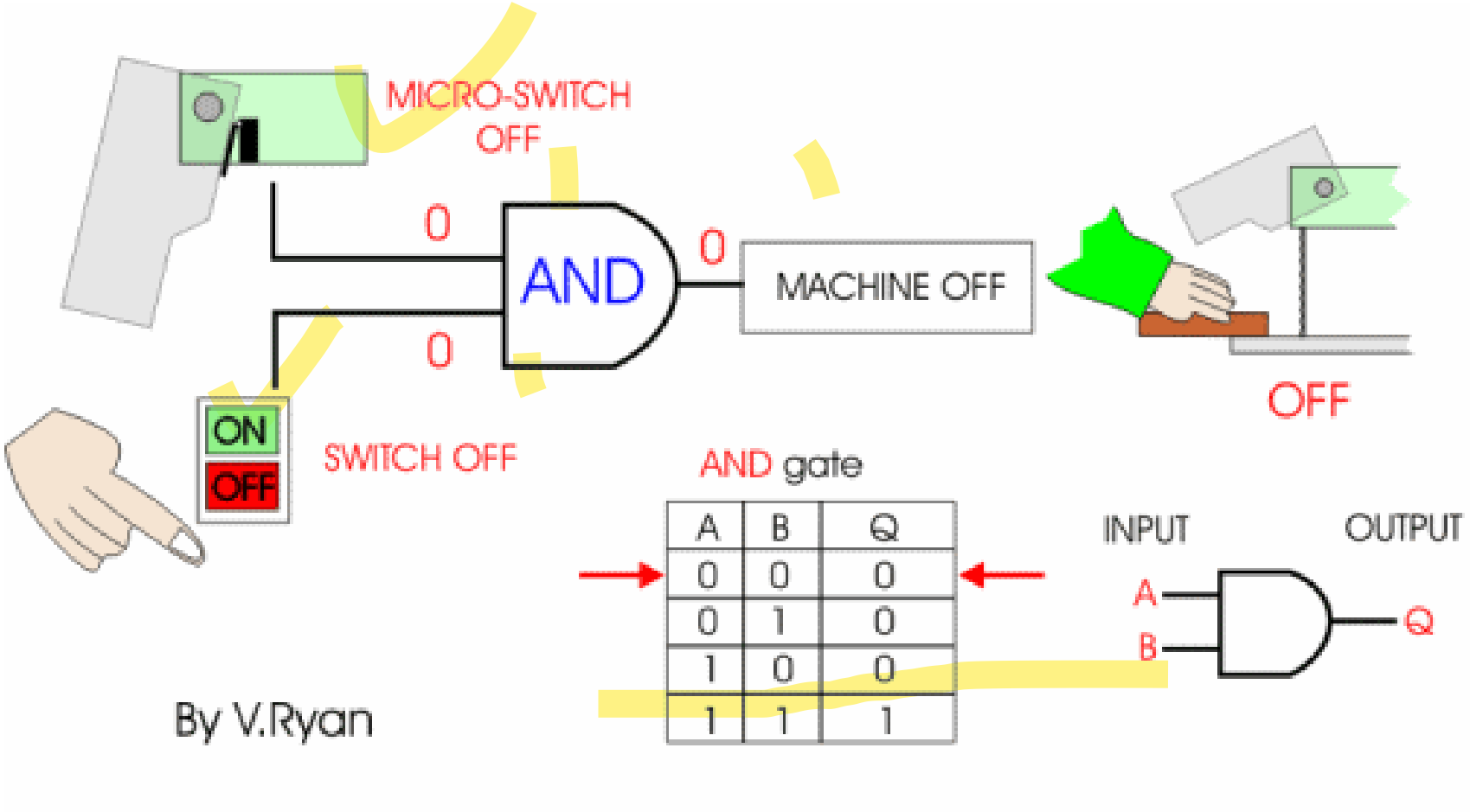
Logic – Automatic Street Light



Logic – Automatic Street Light

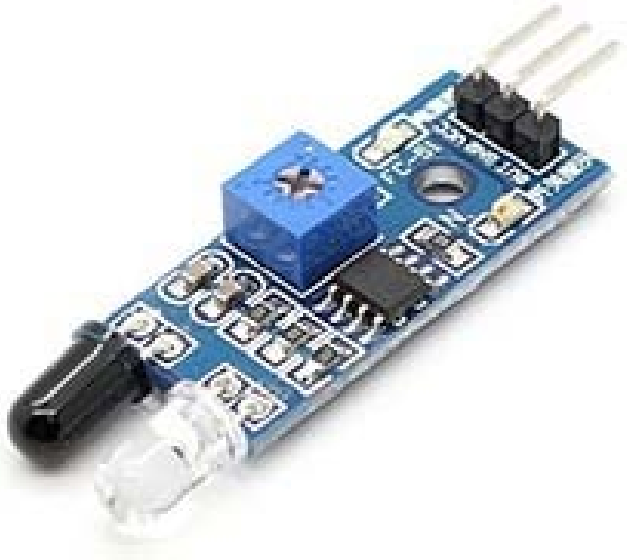


Logic – Emergency cut off



Intro to Sensors

Obstacle/Proximity Detection



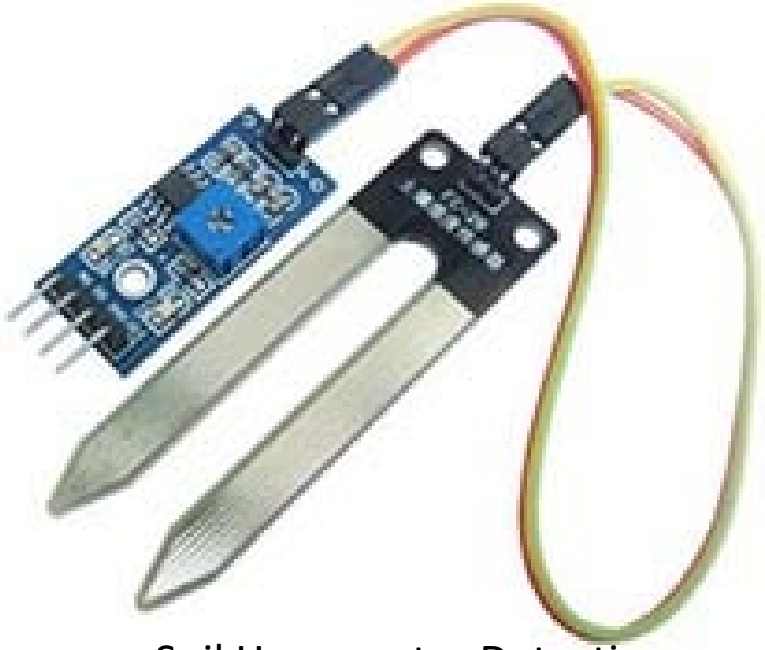
IR Infrared Obstacle Avoidance Sensor Module

HC-SR04 Ultrasonic Module

Moisture/Humidity Detection

Humidity and Rain Detection Sensor Module

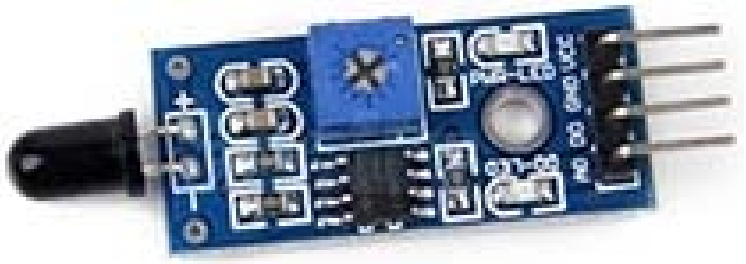
DHT11 Temperature and Humidity Sensor



Soil Hygrometer Detection Module Soil Moisture Sensor

Light/Flame Detection

Photoresistor Sensor Module
Light Detection Light



IR Infrared Flame Detection Sensor Module

Sound/Vibration Detection

SW-420 Motion Sensor Module
Vibration Switch Alarm

Microphone Sensor

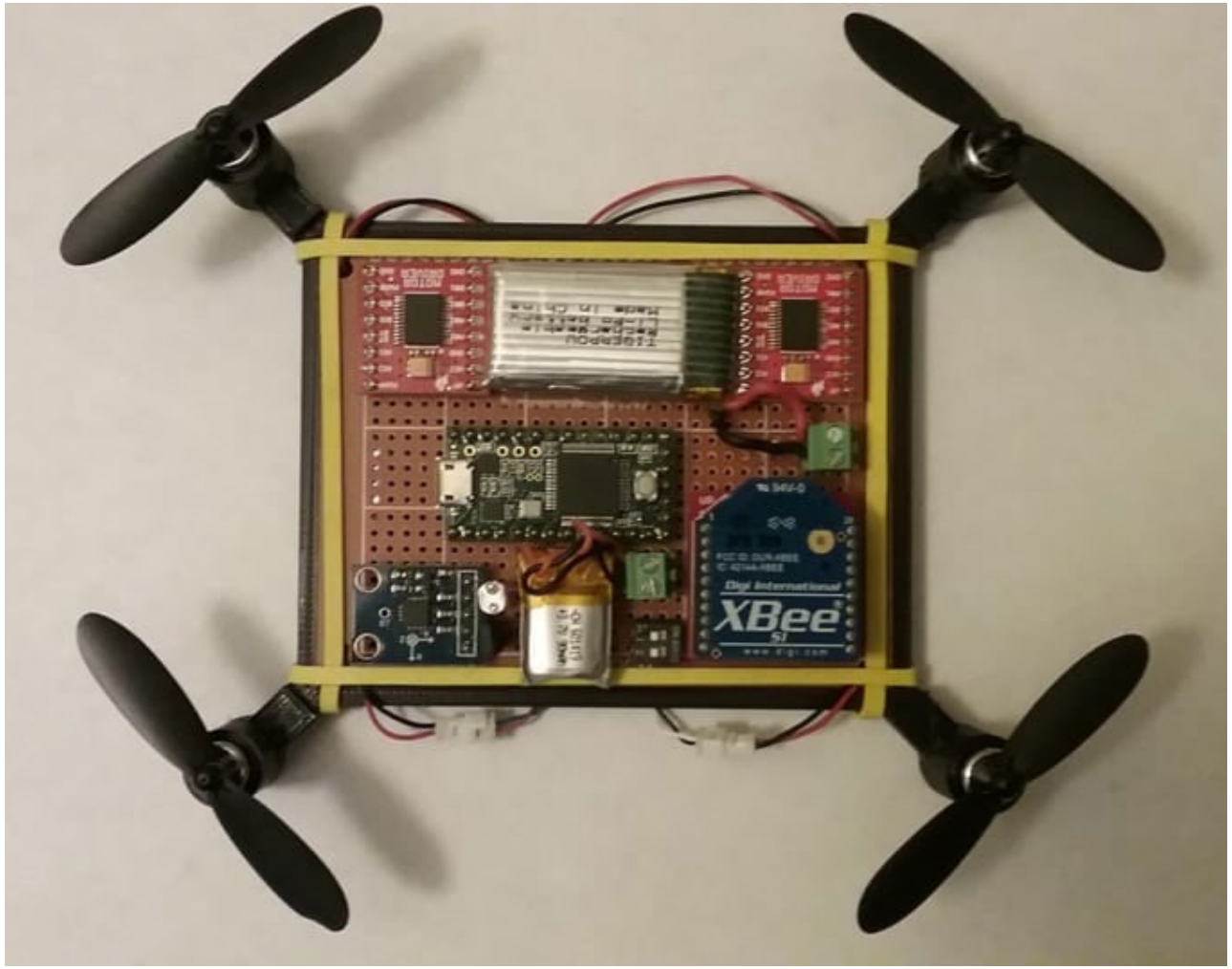
Temperature and Pressure Detection

Digital Thermal Sensor Module Temperature Sensor Module

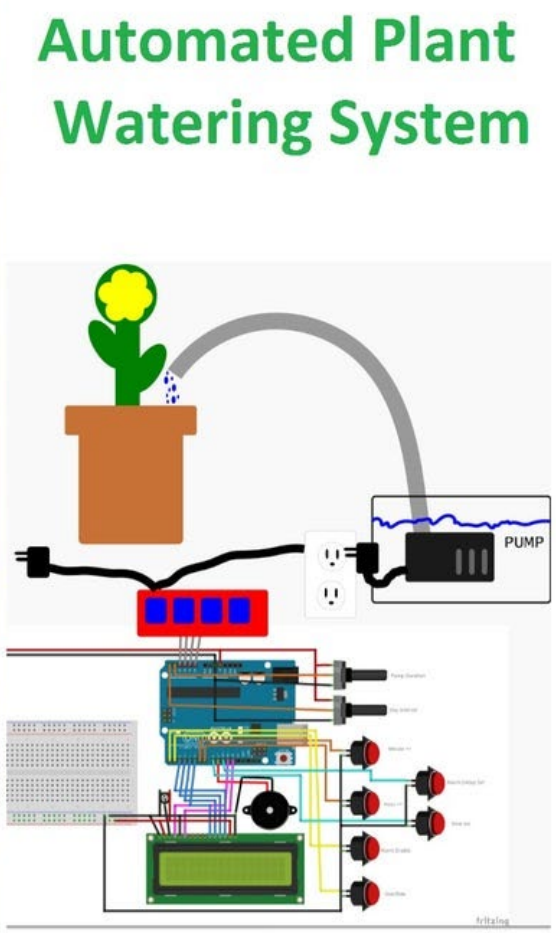
Digital Barometric Pressure Sensor Board

Examples

Drone

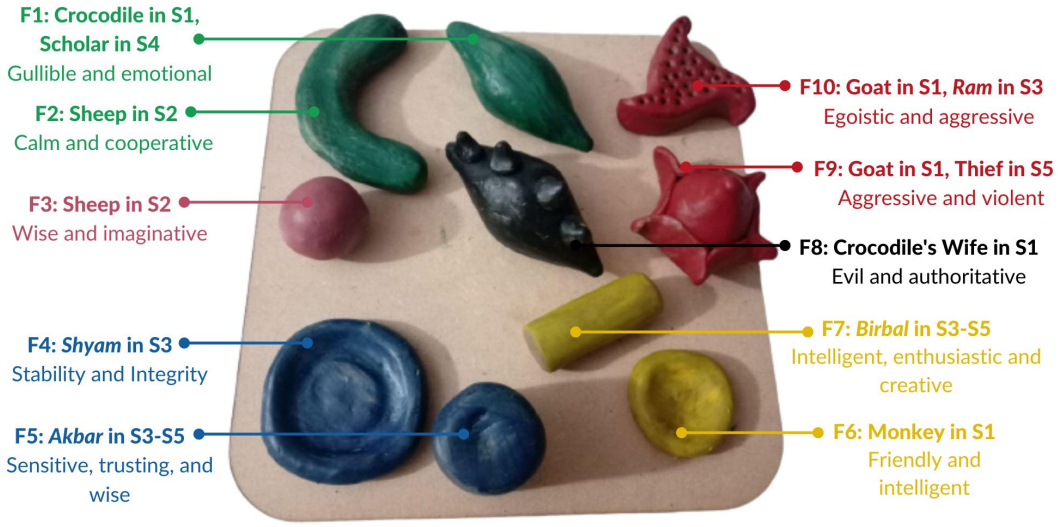


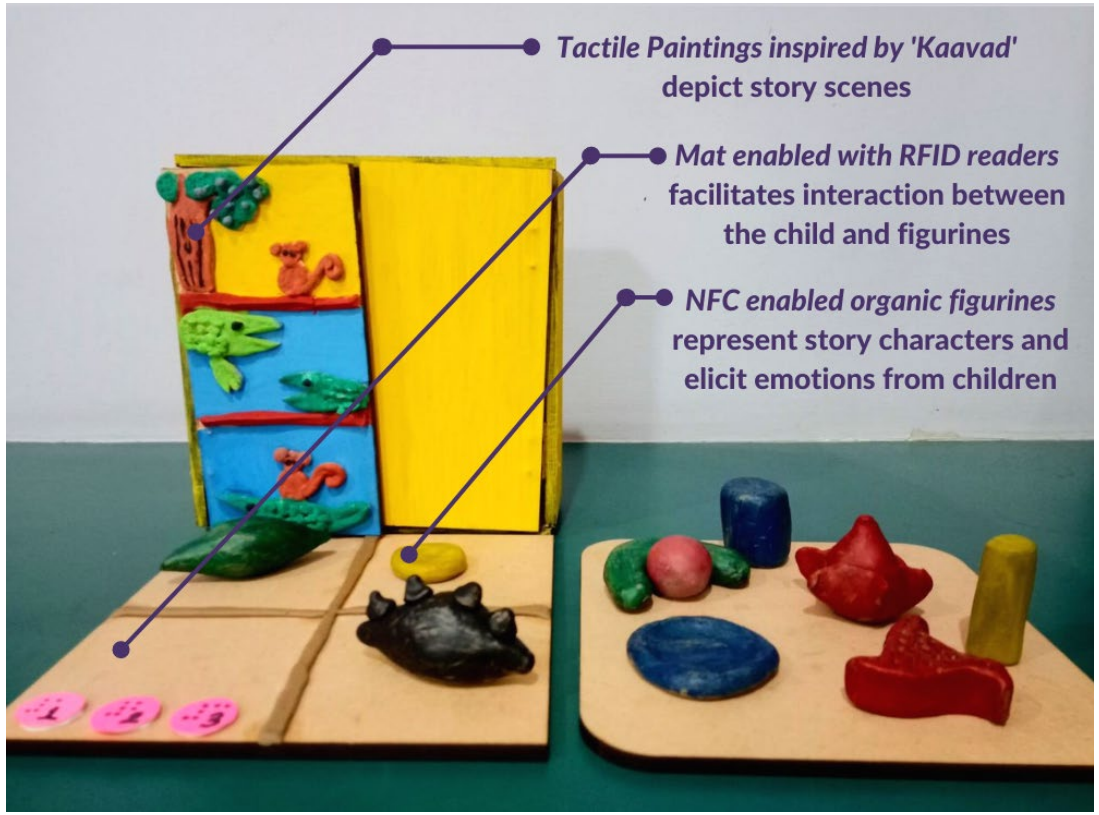
Automated watering system



Interactive Storytelling

StoryBox – Accepted in CHI 2022
Bhavya Chopra





In-class assignments with Arduino

- 2nd and 5th April
- Make sure you are present

Main Project

- **Interactive Toy – FUN & ENGAGING**
- **Select ONE age group and do some research on the sensory, cognitive and motor skills that they have and what kinds of interactions engages them**
  - **Toddler – 2-5 years**
  - **Kid – 5-8 years**
  - **Pre–teen – 8–11 years**
- **Design and model your concept. Give it a name.**
- You can use any prototyping process discussed in the course.
  - Cardboard modelling
  - Clay sculpting
  - 3D printing
  - Laser cutting
- **Arduino board and any two sensor inputs should be used to trigger a logical output**

Main Project Logistics

- Arduino Boards, bread boards and sensors can be issued from DI lab
- DI lab can be accessed and material can be issued
  - 3d Printing and laser cutting during 8th – 12th April
  - Final Assembly and redos during 20th – 25th April
- You can also buy your own material or additional Arduino boards in case your design requires more.

Main Project Final Submission & Demo

- Submission on 25th April
  - Presentation slides
    - Define the target age group you selected
    - Explain the Concept and Design
    - Explain the processes selected and reason for selection
    - Explain the conditional logic used in Arduino part
    - Images of the model and making process
- Final Exhibit on 26th April
  - Model demo – working
  - All other assignments and mini project to be demonstrated