Tangible Interaction Design

20 - 23, 26 - 27th August, 2019

Report

2016-20 Batch | Semester 7 | Academic Year 2019-20

Concept:

- **Dr. Pranita Ranade**
  HoD, User Experience Design
- **Tanmoy Goswami**
  Assistant Professor

Execution:

- **Atul Wadkar**
  Director, Algorithmic Electronics
- **Tanmoy Goswami**
  Assistant Professor

Executive Summary

A Six days **'Workshop on Tangible Interaction Design in UX** has been successfully conducted with the 4th year 'User Experience Design students to get exposure in the area of embedded system design.

This workshop provided outline and enhanced knowledge to students in the area of Microcontrollers, Microprocessors working with different sensors in enhancing User Experience.

Workshop Details

Scheduled Dates	20-23, 26-27th August, 2019 (Total 6 Full Days)
Total No. of Hours	36 Hrs.
Organized by	UED Department
Organized for	**Batch:** 2016-20 **Year:** 4th Year **Specialization: UED** **No. of Student:** 22
Minimum Class Size	22 nos.
Participants	22 Students – 4th Year (Batch 2016-20)
Resource persons	**Mr. Atul Wadkar** Director, Algorithmic Electronics **Mr Tanmoy Goswami** Assistant Professor

Course Methodology

Instructor led training program with practical demonstration by trainer, questionnaires for better learning. Group project implementation support will be provided after the training session.

Aim & Objective of the Workshop

This workshop has covered fundamentals of tangible interaction design and its relevance to user experience design. The main aim of this course was to learn how to enhance human-product physical interaction applying different electronic sensors. Students have been introduced with different theories and practices of tangible interaction design.

In addition, basics of electronic systems have been covered under this course. Students have been able to learn various tools and techniques to design user-product physical interaction to make the tangible system more usable. This workshop has enhanced students' confidence to develop a better product / tool / interface.

Workshop Schedule

Day 1	First Half	**Module 1: Introduction and Familiarization** • Introduction to Arduino • Hardware Overview • Download and Install the Arduino IDE & Sketch Overview • Understanding Arduino Syntax
	Second Half	**Module 2: Basics** • Use of Function • Understanding and Using Variables • digitalRead() and Serial Port Communication • analogRead() and Serial Port Communication
Day 2	First Half	**Module 3: Digital** • Blink an LED With or Without using the delay() Function • Interfacing Buttons (SPST, Push Button) • Interfacing Relay as switch • Interfacing Seven Segment Display • 4X4 Keypad Interfacing with Arduino and Serial Monitor • 4X4 Keypad Interfacing with Arduino and LCD Display
	Second Half	**Module 4: DC Moto, Stepper Motor, Servo** Motor & Arduino • Circuit Diagram of L293D based DC Motor Driver • L293D based DC Motor Driver Interfacing with Arduino in 5V Mode • L293D based DC Motor Driver Interfacing with Arduino in PWM Mode • Interfacing & controlling Servo Motor with Arduino • Interfacing Stepper motor with Arduino
Day 3	First Half	**Module 5: Alphanumeric LCD & Arduino** • Circuit Diagram of 16X2 Alphanumeric LCD • 16X2 Alphanumeric LCD Interfacing with Arduino • Horizontal Scrolling in 16X2 Alphanumeric LCD with Arduino • Horizontal message
	Second Half	**Module 6: Analog to Digital Converter & Arduino** • Analog to Digital Converter (ADC) of Arduino • analogRead () in Arduino

		• Analog to Digital Converter (ADC) of Arduino and Serial Monitor • Analog to Digital Converter (ADC) of Arduino and LCD Display
Day 4	First Half	**Module 7: Getting started with Modules** • Interfacing Bluetooth (HC-05) with Arduino • Interfacing WiFi (ESP8266) with Arduino
	Second Half	**Module 8: Acquaintance of Sensors** • IR Sensor • Ultrasonic sensor • PIR Sensor • LM35
Day 5	First Half	**Module 9: Serial Communication Protocol** ● Arduino – Communication Parallel Communication Serial Communication Modules Types of Serial Communications Arduino UART
	Second Half	**Module 10: Study of Internet of Things**
Day 6	First Half	**Module 11: Android App Development (MIT App Inventor)**
	Second Half	**Module 12: Activity** • Projects

Conclusion

This workshop has projected a high bench mark in understanding tangible product interaction, as well as motivated & inspired the students to use embedded system solutions in their projects.

Students have implemented the following automation projects as the outcome of this workshop.

1. Smart Home Automation
2. Smart Plant
3. Hungry Robot
4. Smart Dustbin
5. Banana Piano

Overall, the workshop was very informative, well-guided and supported by visiting faculty Mr. Atul Wadkar.

Project Title | BANANIANO

Team Members:
Aayushi Jadhav
Abhishek.D
Aditya Shrivastava
Prashant Matta
Vaidehi Vartak
Vini Dhoka

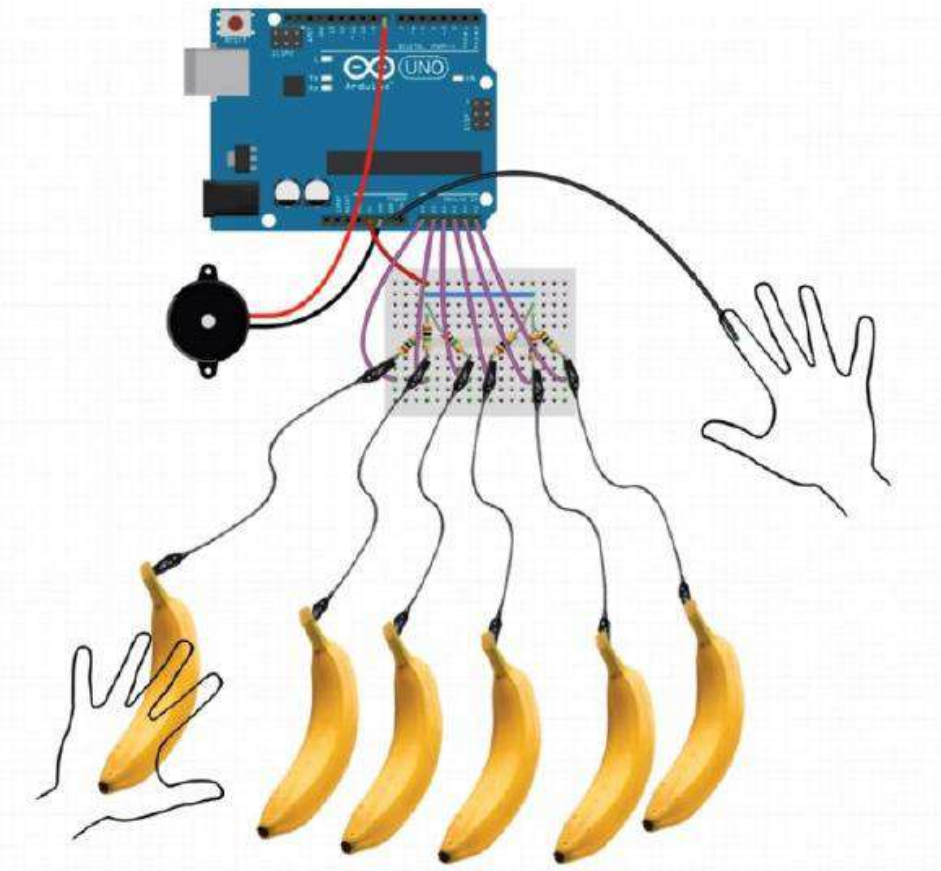
About the Project:
A do-it-yourself kit for children that can be easily made at home under ₹ 750 using a micro-controller, buzzers and bananas.

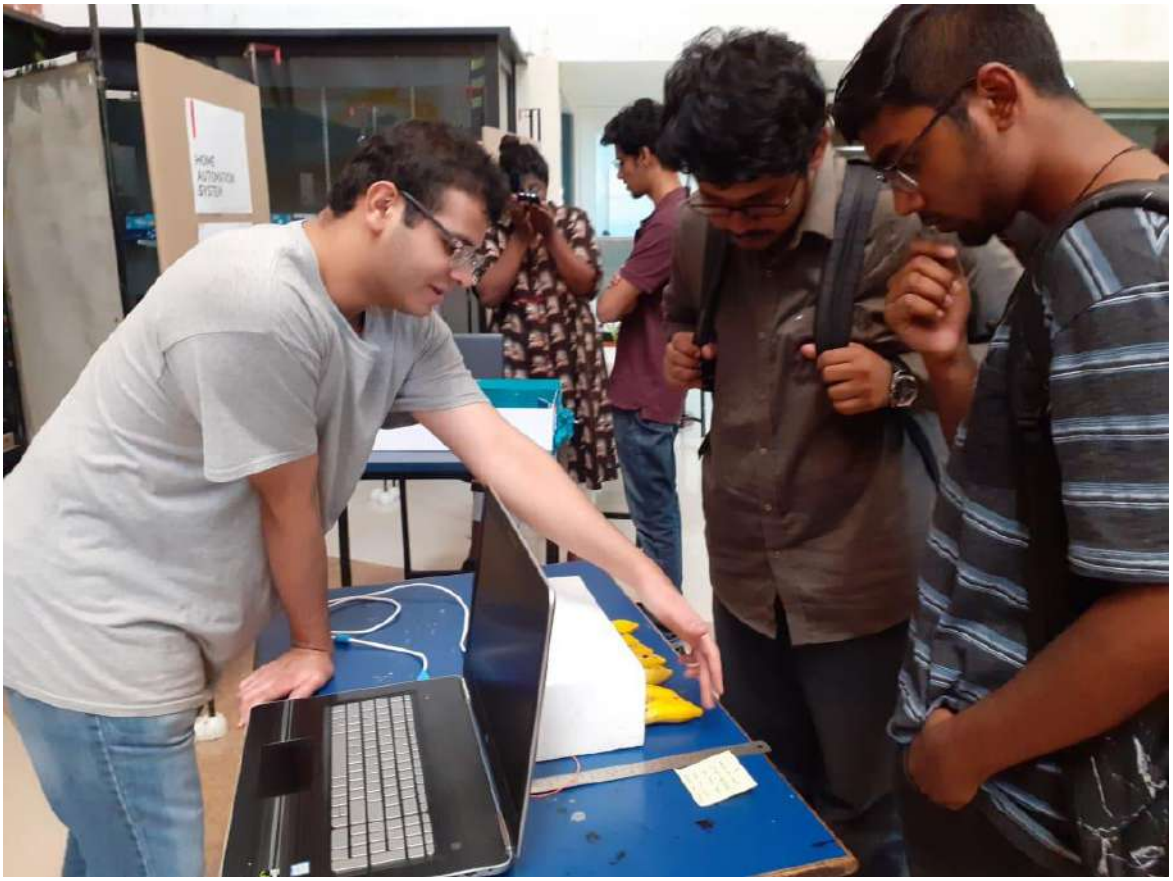
Domain:
Education and Entertainment

Users:
Students and people with curiosity to learn basic electronics

Purpose:
To create an interactive educational experience to teach students about basic physical concepts like series/parallel circuits, conductance, sound frequency, and an introduction to coding.

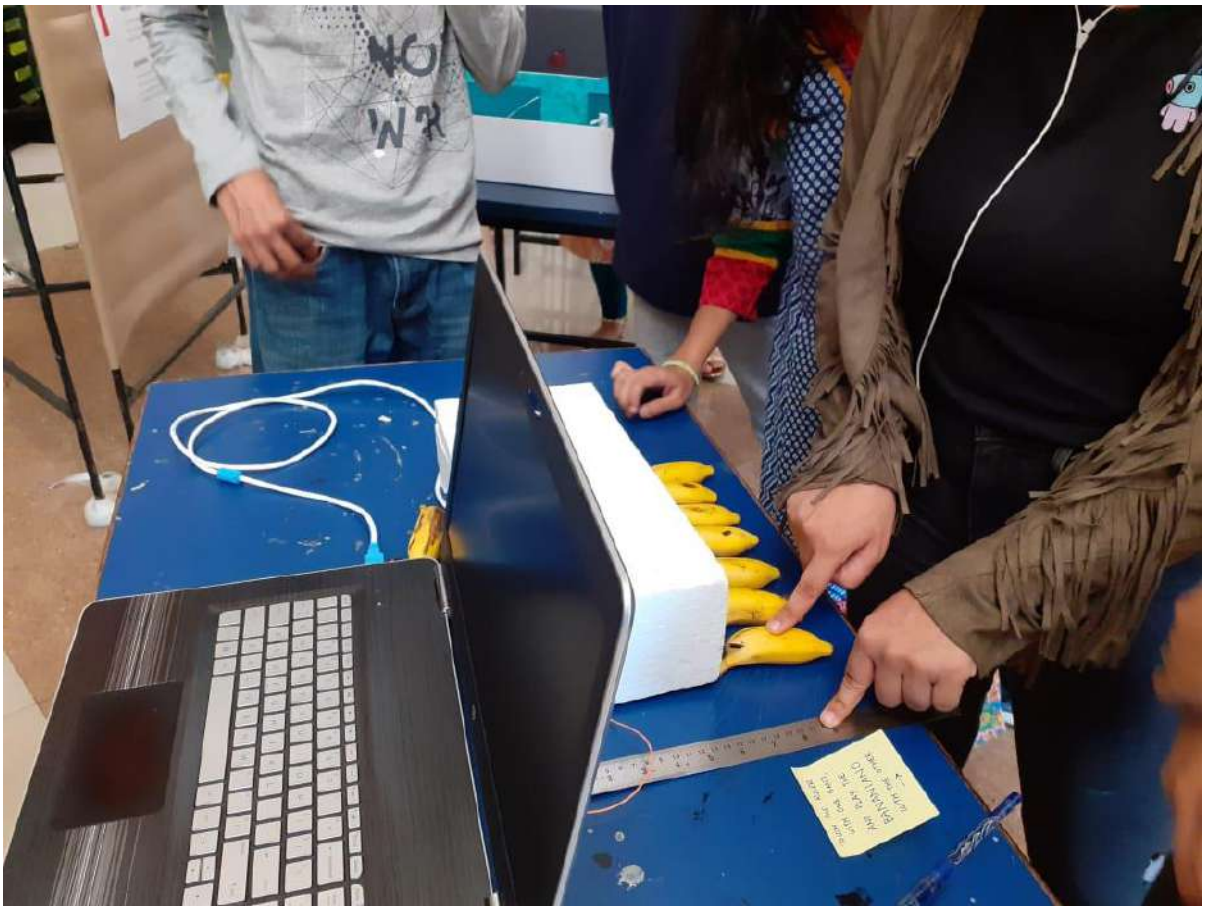
Sensor Diagram:




HOME
AUTOMATION
SYSTEM


ERICAN EAGLE


MAKE
PEACE
WAR



Project Title | HOME AUTOMATION SYSTEM

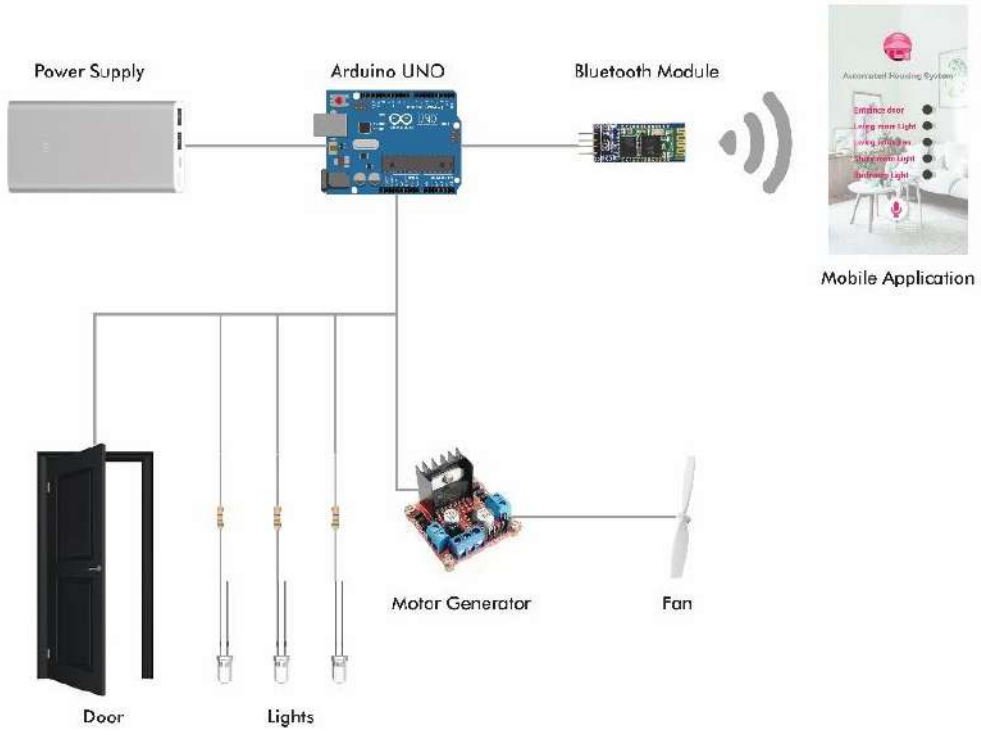
Team Members
C. Aarsha Bharathi
Sanika Modhe
Yamini Kishore

Project brief
We have depicted the use of Home automated systems within a small-scale model using Bluetooth, a phone application and a voice recognition feature.

Working
Home automation system using a simple Android app, which you can use to control electrical appliances with clicks. Commands are sent via Bluetooth (HC06) to Arduino Uno, which controls the operation (ON or OFF)

Materials Used
Power Supply- Laptop
Microcontroller- Arduino UNO
Bluetooth Module
Mobile Phone- To access the application
Resistor
LED Lights
Jump wires
Motor Generator
Propeller- as fan
Foam Boards and Paper for the model

Circuit Diagram



Project Title | HUNGRY ROBOT

Team Members
Charu Sharma
Isha Amberkar
Mishel Joseph

Project Brief
To design a product for 'better living for tomorrow in the form of tangible interaction design. The aim was to make a viable solution which is cost effective and sustainable.

Users
- Children
- Middle Aged
- Senior Citizens

Stakeholders
- Municipality
- NGOs and Private Organizations for Environmental Welfare

Purpose
The purpose of the hungry dustbin is to enhance the experience by improving the function of throwing the garbage. It will also help instill a sense of responsibility towards the environment in the young minds which will in turn ensure a sustainable future.

Functions
- The dustbin has a proximity sensor which detects when someone puts trash in the given tray and automatically eats it on its own using the servo motor function.
- This also ensures the hygiene and protection from germs as one does not have to touch the dustbin in any way.

Project Title | THE SMART BIN

Team Members
Gayatri Ketharaman
Shamlika Athma
Tejaswi Borkar

About the product
Purpose
To help manage the existing garbage disposal system efficiently

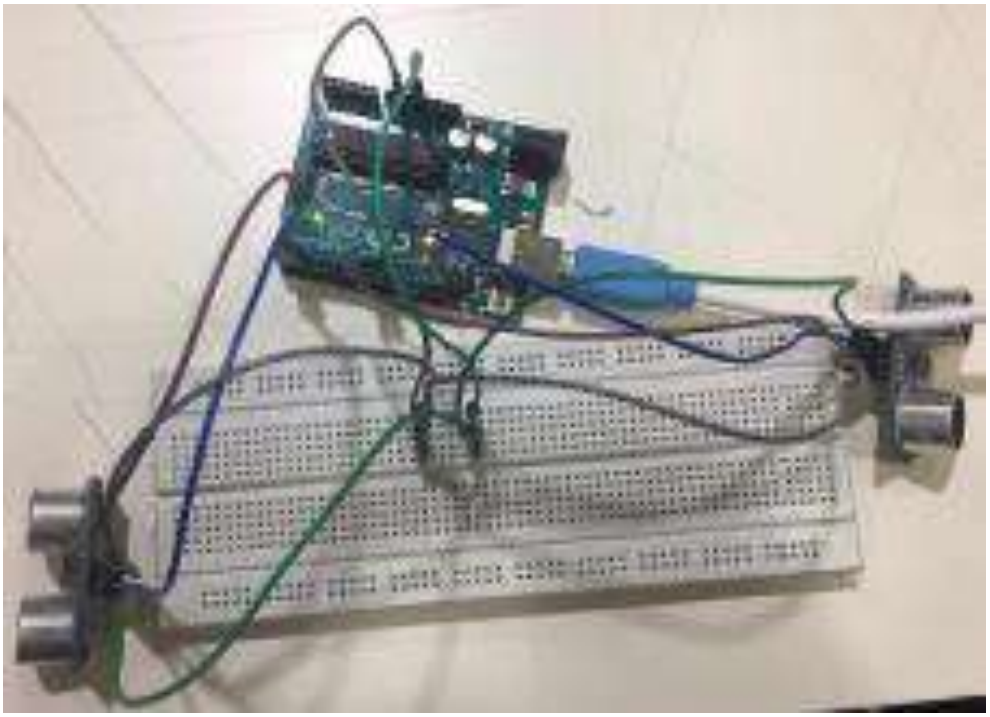
Problem Statement
Overflowing dustbins cause litter and unhygienic conditions on roads.

Project brief
A Smart dustbin that notifies the concerned authorities when it is on the verge of overflowing so they can clean the trash out, preventing litter when dustbins overflow and saving municipal authorities unnecessary trips when dustbins are not full.

Target audience
Municipal corporation authorities

How it works
The sensors detect the level of trash in the dustbins and, once full, authorities will get a message notifying them to collect the trash and telling them the location of the dustbin.

Materials used
Arduino Uno board- 1
Ultrasonic sensors- 2
Breadboard- 1
Wires



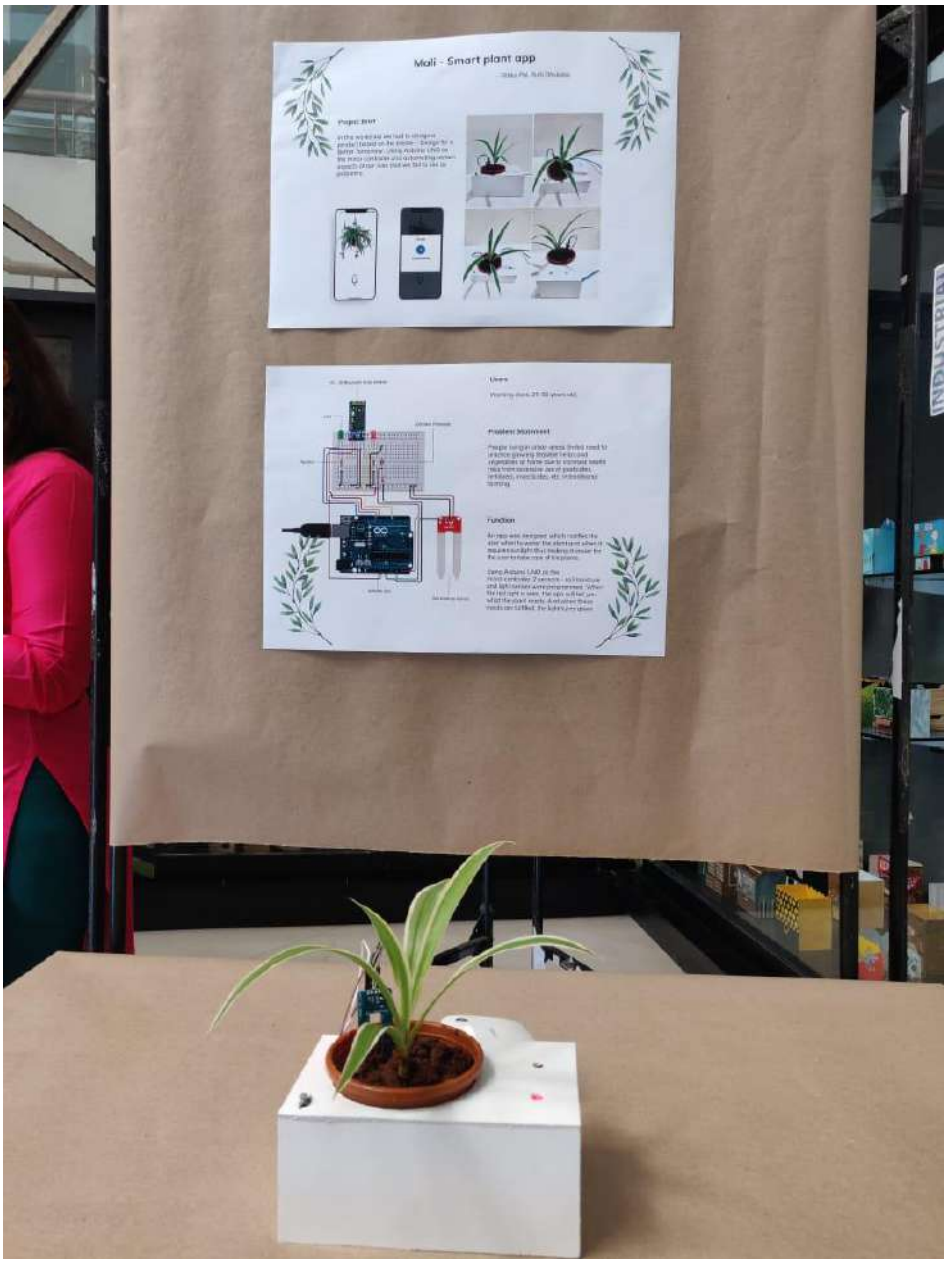

The Smart Bin
The Smart Bin

Project Title | MALI SMART PLANT APP

Team Members
Ritika Pal
Ruhi Dholakia

Brief
In this workshop we had to design a product based on the them ‘Design for a Better Tomorrow’. Using Arduino UNO as the micro controller and automating certain aspects of our lives that we fail to see as problems.

Materials Used
Arduino UNO, Resistor, LED, Bluetooth Serial Module, LDR, Soil Moisture Sensor, Female and Male wires.



Mali Smart Plant App

- Ritika Pal, Ruhi Dholakia

Project Brief

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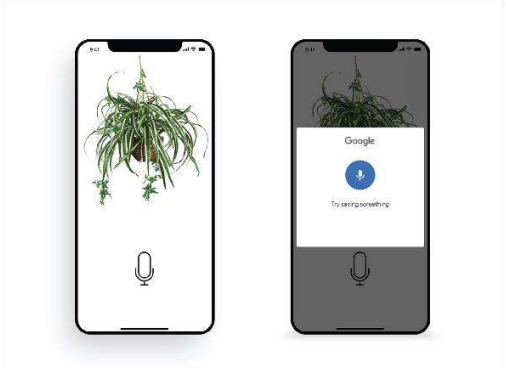

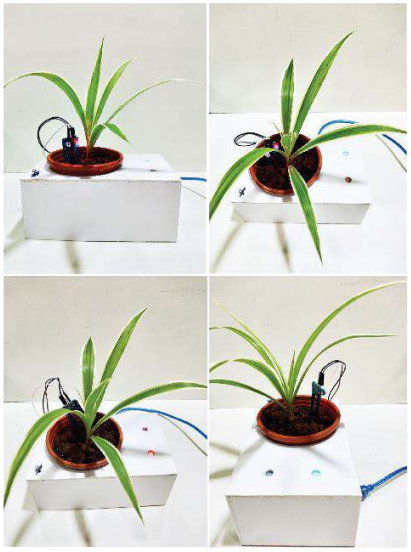

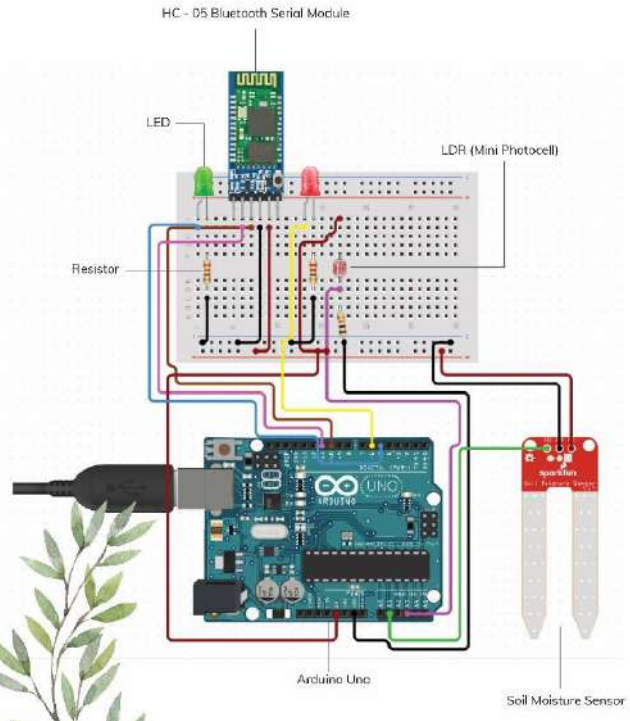

Users

Working class, 25-55 years old.

Problem Statement

People living in urban areas (India) need to practice growing feasible herbs and vegetables at home due to incresed health risks from excessive use of pesticides, fertilizers, insecticides, etc. in traditional farming.

Function

An app was designed which notifies the user when to water the plant and when it requires sunlight thus making it easier for the user to take care of his plants.

Using Arduino UNO as the micro-controller, 2 sensors - soil moisture and light sensor were programmed. When the red light is seen, the app will tell you what the plant needs. And when these needs are fulfilled, the light turns green.

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