# Sikaru Saathi

## [Soldering, deSoldering]

**A little background of this lesson:**

- Welcome to day three of Sikaru Saathi Bootcamp! Today's lesson will focus on an essential skill for repairing electronic devices - soldering and desoldering.
    - In this class, you will learn how to safely and effectively solder and desolder components on a printed circuit board. This skill is essential for repairing electronic devices and extending their lifespan, as well as minimizing e-waste.
    - Before we begin, it's important to note that soldering and desoldering can be dangerous if not done properly. Therefore, we will take all necessary safety precautions to ensure a safe learning environment.

**Materials Required**

| Component Name | Number |
|---|---|
| **Universal** | |
| Speaker system (Optional)<br>(Using this to play music when participants are working in stations) | 1 |
| Normal Wire (red and black) | 1 Meter |
| A4 papers | 3-4 |
| Cardboard | 6 |
| Cutting Station with (paper cutter and scissors) | 2 |
| Soldering Station<br>(Soldering Iron, Soldering stand, Soldering Tin, and wax) | 3-4 |

| | |
|---|---|
| Desoldering | 1 per station |
| Multiplug | 1 per station |
| **Per Group** | |
| Leds | 10 |
| MultiMeter | 1 |
| 9V Motors | 2 |
| 9V Batteries | 1 |
| Battery cap | |
| Capacitor | 3 |
| PCB plates<br>(These are old PCBs taken from e-wastes) | 2 |
| Screw Driver set | 3 |
| On/Off Switches | 2 |

**Curiosity**

[Curiosity is an essential element of learning, and in this section, we will aim to engage participants with questions that encourage curiosity and critical thinking about today's lesson.]

- Why is soldering important in reducing e-waste?
- How does soldering help to establish a culture of repairing?
    - By learning how to solder, participants can gain confidence in their ability to repair and refurbish electronics, and may be more likely to engage in repair culture as a result.
- What are the safe handling procedures for soldering and desoldering?
- What are the different uses of soldering?
    - Soldering can be used for a variety of applications, including repairing electronic devices, creating circuits and connections, and attaching components to circuit boards.
- What are the steps involved in soldering and desoldering?
    - The steps involved in soldering and desoldering include preparing the surface to be soldered, applying the solder and heat, and then removing the solder if necessary. Desoldering involves the additional step of removing existing solder from a component or connection.
- What is refurbishment and how can it help reduce e-waste?
    - Refurbishment involves repairing and restoring electronic devices to their original condition, often using components and parts that have been salvaged from other devices. Refurbishment can help reduce e-waste by extending the lifespan of electronics and reducing the need for new devices.
- How can we identify different components and understand their usage in repairing electronics?
    - Identifying components and understanding their usage involves becoming familiar with common electronic components such as resistors, capacitors, and diodes. participants can learn to identify these components through visual inspection and by consulting resources such as schematics and datasheets. Understanding the usage of components involves learning about their function and how they contribute to the operation of a circuit or device.

## Activities

### Energyzer

- Pick a fun game that will allow students to get to know each other and play it with the students. We recommend games that require physical movement so that the students get energized.

- **Red light Green light. (Options)**
  - When you shout “green light” the children must all run towards you, but when you shout “red light” they must stop and freeze. Anyone who moves when you say “red light” must go back to the starting line and start again. The object of the game is to cross the finish line as quickly as possible.

### Recap of previous class

- What did you learn about LEDs in the last class? How does an LED work and does it have polarity?
  - Can you explain how a breadboard works and its importance in prototyping electronic circuits?
  - Did you find it difficult to create different circuitry on a breadboard? If so, what challenges did you face and how did you overcome them?
- What project did you come up with during the last class? How did you use the concepts you learned about LEDs and breadboards to create your project? What challenges did you face and how did you overcome them?
- What did you enjoy most about the last class and why?
  - Is there anything you would like to explore further in the upcoming classes?

### Completing Day 2 project (Optional)

- If participants did not complete the project in the previous class, the Facilitator can use this class as an opportunity to provide time for participants to work on their projects. The Facilitator can begin by asking participants about their progress on their projects and what challenges they are facing.
  - Based on the responses, the Facilitator can offer support and guidance to participants as needed. For example, the Facilitator can provide additional instruction on how to use electronic components or troubleshoot any issues participants may be experiencing.

## Soldering

- This is the main focus of today's session. So make sure to make few soldering station ready before this section starts
    - **Note to Facilitator:** We can turn our cutting station to a new soldering station just by removing scissors, paper cutter and adding safety gloves, goggles and soldering equipment.
- Facilitators shows a PCB board to participants and asks participants
    - We usually use tapes to attach two components together but how are the components sticking in the board?
    - Have you ever heard of the word “Soldering?”
        - If yes where?
    - Have you ever done any soldering?
        - How do you start?
    - Why do we need to solder electronic components? Can we just use tapes instead of soldering?
    - Do you know what tinning is?
        - Tinning helps soldering iron to work properly in long terms and prevent soldering iron catching from rust

- Facilitator shows a popper way to solder two piece of wire
    - Here the Facilitator is giving a demo now how soldering is done, so the Facilitator must follow all the safety guidelines.
        - Using Gloves before touching the soldering iron
        - Using goggles
        - Soldering should be done in an open area where there is enough space for air circulation.
    - **Note to Facilitator:** Facilitator need to emphasize that the use of soldering is to connect wire or components not to poke a hole to any plastic components

- After proper demonstration and safety precautions ask participants to strip two wire and try connecting them with Strip two wire and try connecting them with
    - Tapes
    - Soldering technique
- Ask participants to test the durability of both techniques. They can pull the wire, add weight, and long term usability.

- If participants want to solder other components other than wire they can do that.
    - Make participants practice this activity and share that this skill is very important while making our final project.

[How to use a soldering Machine]

**Multimeter**

- Participants by now must have gained confidence and skill to properly solder components.
- Now participants will be introduced to multimeters. They might have seen these components on day 1 but may not have known its use case.
- facilitator  share about multimeter:
    - What is it and where is it used?
        - Common use are to
            - test Voltage of battery or any power supply
            - Check the resistance of components
            - Connection of circuit
- Facilitators demonstrate use by testing them to check capacity of battery, measure the resistance of wire or even humans.
- Facilitator keeps the multimeter to soldering station and asks participants to check if their soldering is proper done with the help of multimeter
    - Checking the two end of wire and verifying it is connected properly

[How to use a multimeter]

**Desoldering**

- While participants are soldering they might have made a few mistakes;
    - wire might be loose,
    - they might have used excess soldering wire which might have made their wire/components look bulgy.
- The facilitator  asks that if we were using tapes we could easily fix it and attach it properly again and again until we are satisfied but can we do the same with soldering?

    - Ask participants if they know any way to fix their soldering?
    - If there are tools to fix our soldering?
- Now the facilitator  shares that even if there were a few mistakes we can fix our soldering by showing a desoldering device.
- The facilitator  gives a demonstration on how to desolder any soldered components.
- Ask participants to practice this technique on their soldered components.
- participants can also use a PCB board and try taking out components from that board.

**Reflection**

participants will share their learning from today's session.

At the end of this class, remind participants of our class prompt and make them think about how we can use our learning to figure out the solution of the problem.

- It's the year 2200 and humans have abandoned earth. It has become covered with trash from products sold by powerful companies, and we ran out of resources to grow food, build buildings, and create the electronics that make our lives convenient. We now live in a rocket ship slowly traveling in the atmosphere, searching for another planet that can support life. WALL-E, a garbage collecting robot, has been left on Earth to clean up the mess so that humans can once again inhabit the plant. WALL-E is a curious robot, often playing with the electronics he discovers. WALL-E is alone on Earth so he frequently feels lonely. When he has free time, he tinkers with parts to try and create something useful to his life or to create a toy that can keep him entertained. WALL-E looks for useful electronic parts to add to his inventory to invent new things. Help WALL-E by scavenging through junk to find parts and creating new inventions to keep him entertained!