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**Designers in Residence Program**

**Cycle 1**

**Project Report # 2**

**Project Name: Chaff Cutter**

**Introduction:**

The project aims to install a safety add-on, on chaff cutter machines which are used primarily in villages all across the country. Considering the high rates of amputations and injuries recorded by the users of this machine, our group is working to find an electronic solution to detect human hand inside the moving machine. We aim to find a solution that has:

1. Minimal Response Time
2. Is cost-effectiveness, and
3. Is easy-to-install

**Worked Planned Last Two Weeks**

We had aimed to work on Walt Disney’s capacitive touch system, Touché, as well as modify the previous model of capacitive touch sensor. The third and final target set by us was to test thermal imaging using, the IR temperature sensor, MLX 90614.

**Work Completed in the Last Week**

Throughout the last two weeks, we worked on the targets we had set, tried new solutions to our problem and modified the old test cases to see if they could work under different conditions. Summarising, we carried out the following tasks:

* **Thermal imaging:** We used the MLX-90614 IR temperature sensor to make use of thermal imaging but the fact that the sensor’s results were interfered by the environment, meant that we could not continue working on it.
* **Touché:** We tried to replicate the capacitive touch sensor of Walt Disney and successfully managed to build a sensor that could detect different states of environment (state of touch, grab and water). The sensor was perfect for use except for one major flaw; it had to be calibrated every time we reset the Arduino, something we cannot expect from the user. So unfortunately, we had to stop working on Touché as well.
* **Simple Capacitive Touch sensor:** We also modified our already working capacitive touch sensor by changing the wire type, resistors and capacitors. The changing sensitivity can provide results to our requirement. However, we can only develop it further after testing it out on the actual machine.
* **Touch sensor using our body resistance:** Yesterday, we found another working solution for our hand detection sensor. By using a simple transistor, we made a circuit that can light up a led once a human hand makes contact with the sensor pin. This, unlike body capacitance, uses body resistance. This idea has equally good results as the simple capacitive touch sensor and can be developed once we test it out on field.
* **Ohmmeter:** We also made an ohmmeter using the voltage divider concept, with our human body being the unknown resistor however, the results were fluctuating and hence unsatisfactory.
* **CAD designing:** With the external gears already made, we continued the CAD design of the machine and made the shaft, along with the hub, synchronizer cone and the sleeve.

**Work Planned for Next Week**

After visiting the field tomorrow, we’ll see if our hand detection mechanism actually works on field. If it does, we’ll start working on the gears and braking system. But if it doesn’t, we’ll change the direction of our project by finding mechanical solutions since we have already tested out all the cheap and responsive, possible electronic solutions.

**Comments/Feedback:**

In case our sensor works tomorrow on field, we need some guidance with regard to gear mechanism from some mechanical engineer or any other expert from this field.