ABSTRACT

Stone-Paper-Scissor Champion

Team Name - Trace Elements

Team Members:

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We will make a computer program which will play stone - paper - scissor with humans and always win. We will use image processing to identify hand gestures and will accordingly give output to our 10*10 LED pattern. Then it would send the counter move signal and counter move would be displayed on led grid. We will preliminarily train a ML Model with several pictures of paper, scissor and rock hand gestures. We have written the detailed description of what we found and implementation.

Motivation

The interesting nature of this project itself is enough to motivate us. And we get to learn a lot of stuff from this project.
We know that it does not have any direct practical application but we love the idea and are definitely going to enjoy making it.
We were inspired by the following video - https://youtu.be/3nxjjztQKtY. (although we could not find any documentation related to it)

What have we found out..

1. We will capture the image of the hand of the player using laptop camera and process it using OpenCV on python.
2. Then we will give the output of the program as input to arduino, which will display the output on 10x10 led grid.
3. At first we decided to show output with robotic arm but as per comments and suggestions from mentor and other people we ditched that idea. Instead, we have decided to display computer's output on 10x10 LED grid.
4. We are using jupyter notebooks as IDE. They say that it is overall a good IDE and works extraordinarily well for Machine Learning.

Phase I promises Completed

1. All team members have learnt necessary python coding.
2. We have learnt git for version control and are already using it as four of us are working on the same code.
3. Two of team members have almost completed learning basics of computer vision necessary for our project.
4. We decided on the 10x10 LED output mechanism lately , so we also need to learn arduino, we have started with it.

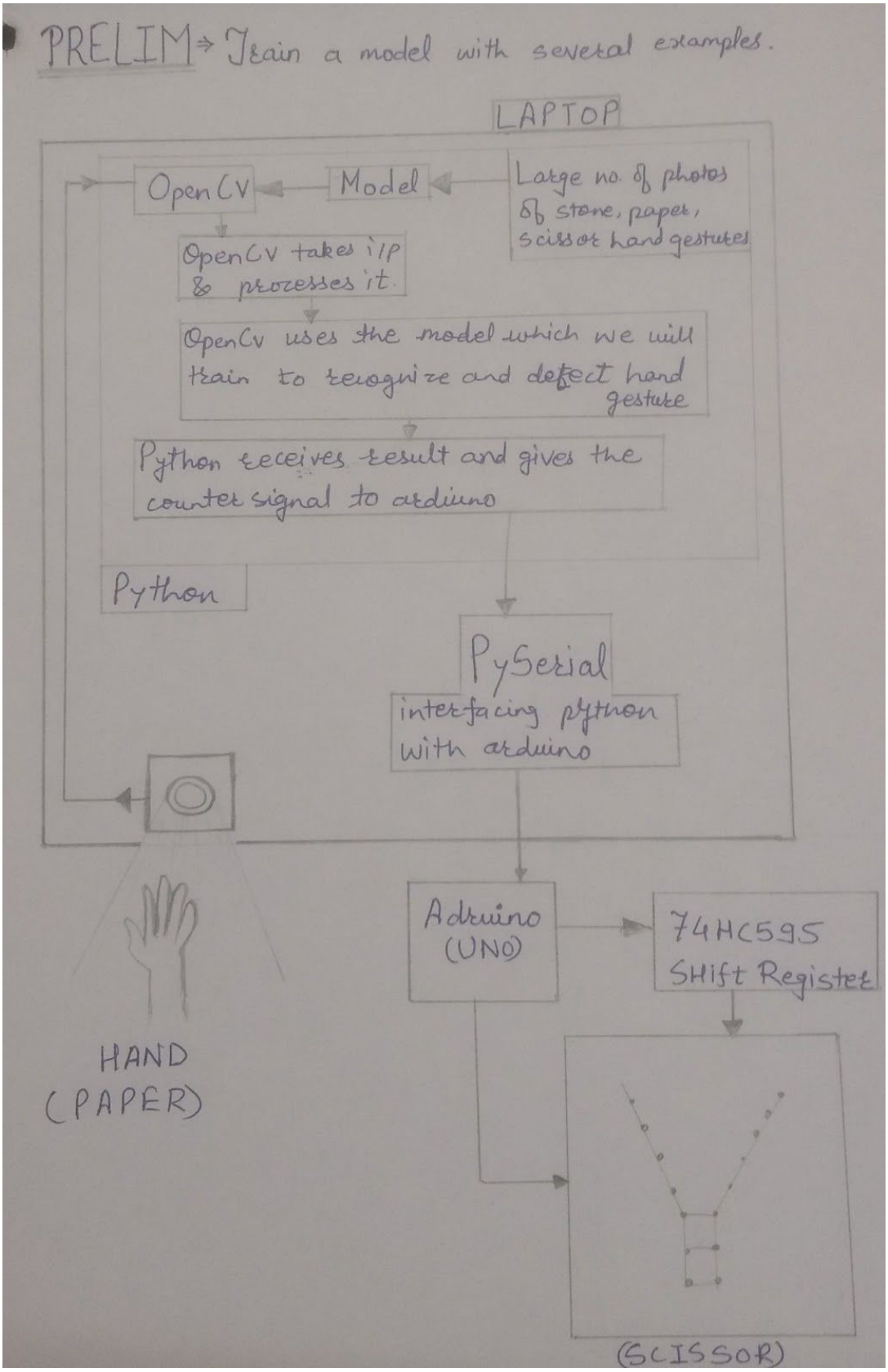
Estimated Cost

Components	**Quantity**	**Price**
LED	100	Rs. 150
Arduino Uno	1	Rs. 499
74HC595 shift register	1	Rs. 200
Other electrical components (like resistors, PCB)	-	Approx Rs. 300
Total		~Rs. 1150

Implementation

1. OpenCV takes the input from camera and converts it to a form where fast comparisons can be done. We are yet to decide which algorithm to use.
2. We will be writing the program in python for above in early stage jointly (using git) and would also push to GitHub.
3. We are using jupyter notebooks(Python 3.6) as IDE.
4. We would train a ML model with pictures of the required hand gestures and have OpenCV use that model to recognize the provided gesture. We will use TensorFlow for that. The model will also make use of the algorithm for fast comparison.
5. We would use pySerial to send the instructions to Arduino Uno.
6. For LED grid display, we will use IC 74hc595 for multiplexing.

PRELIM → Train a model with several examples.



TIMELINE

Week	Expected work
March	Collecting information and learning programming language.
Week 1	Start looking for different algorithm to be used and also Get completed with learning arduino.
Week 2	Get started with coding for gesture recognition
Week 3	Get the gesture recognition code completed and start with coding arduino. Also write the program for paper scissor rock.
Week 4	Get arduino code completed and also start with building the circuit .
Week 5	Testing, debugging and finishing
Week 6	Trying the below given possible extension+buffer days

Note:

There is also a small probability that the algorithm we select is not actually fast enough. That's the reason why we need buffer days.

Possible Extension:

We will extend stone-paper-scissor to stone-paper-scissor-lizard-spock champion.