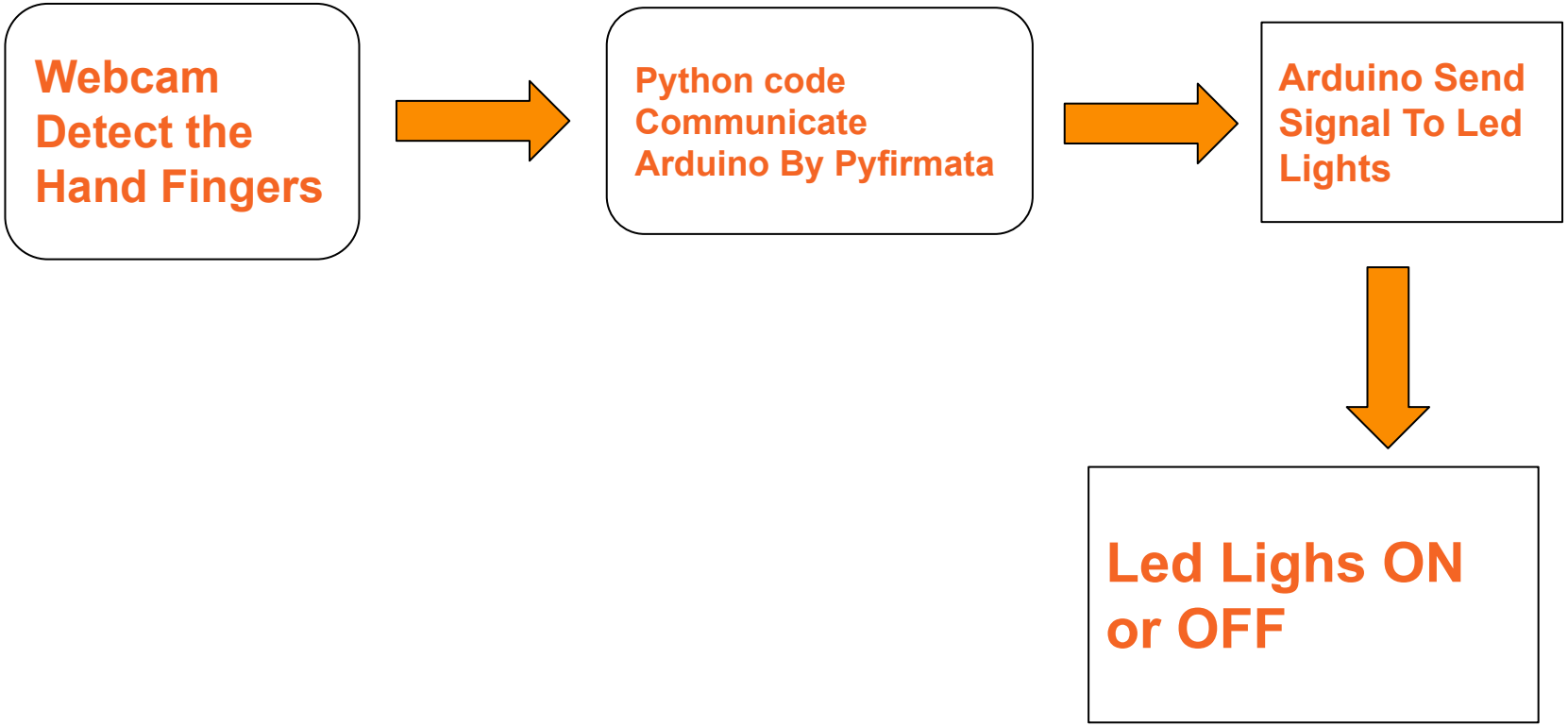
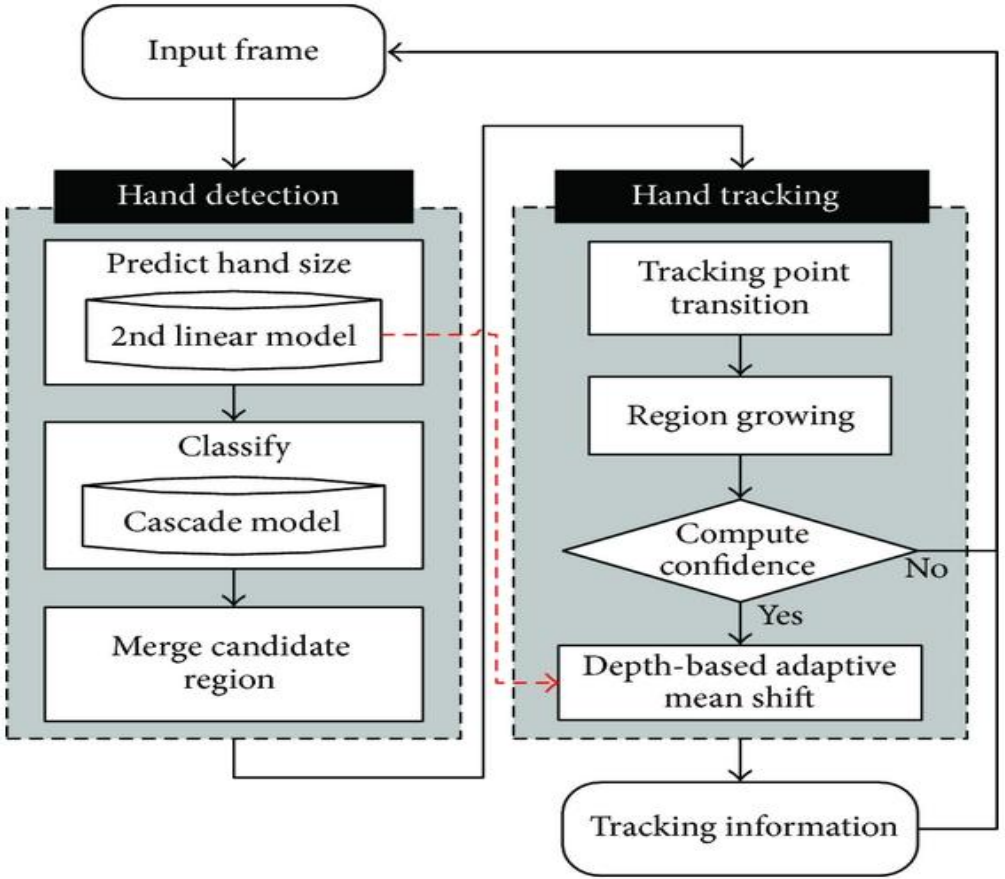
LED Control Using Hand Fingers

Using Python, Mediapipe, OpenCv And Arduino

Block Diagram



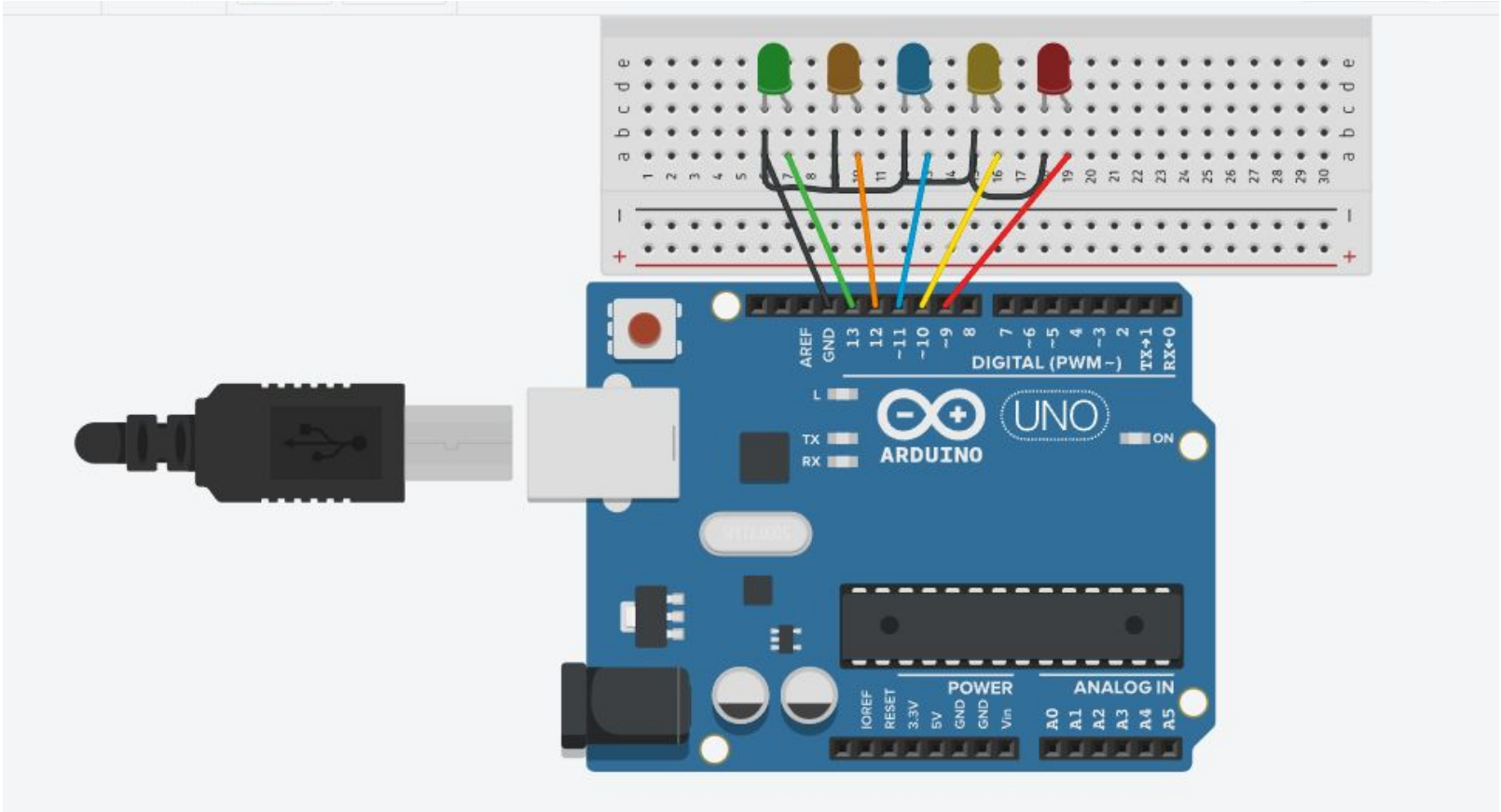
Flow Chart


Input frame
Hand detection
Predict hand size
2nd linear model
Classify
Cascade model
Merge candidate region
Hand tracking
Tracking point transition
Region growing
Compute confidence
No
Yes
Depth-based adaptive mean shift
Tracking information

Component List

1. LED Lights
2. Arduino
3. Jumber Wire
4. Bread Board

Circuit Diagram

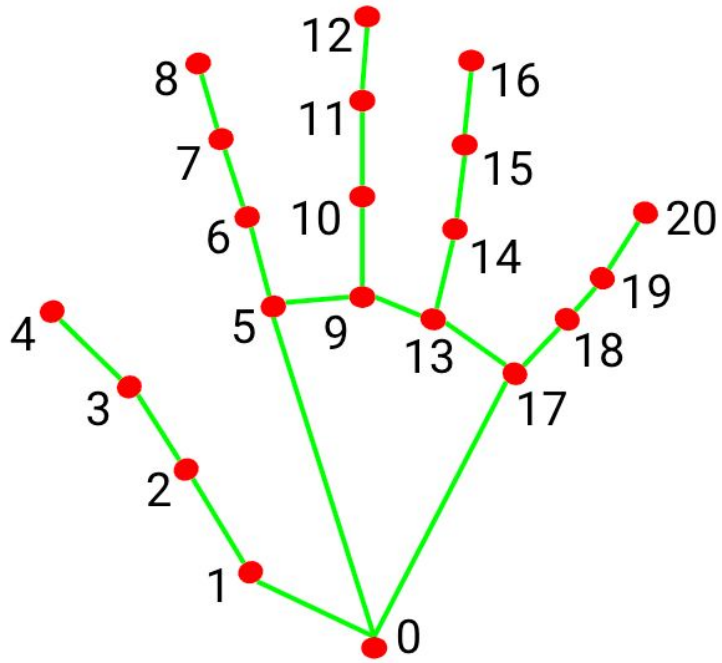


What is Firmata

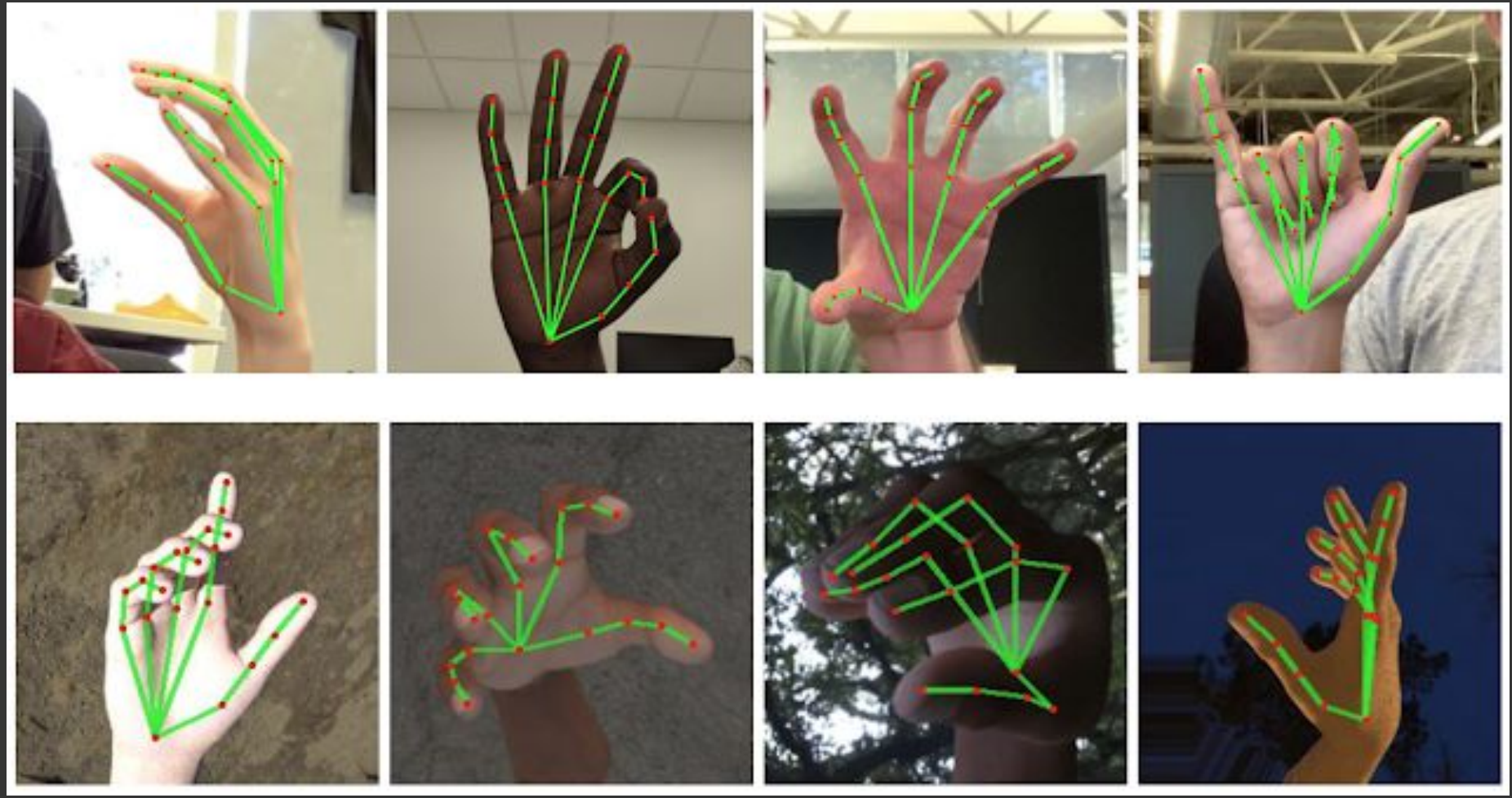
Firmata is an intermediate protocol that connects an embedded system to a host computer, and the protocol channel uses a serial port by default. The Arduino platform is the standard reference implementation for Firmata. The Arduino IDE comes with the support for Firmata.

Introduction

In the past decade, there have been intensive studies on the automatic analyses of human behaviors. Among the study areas, the human-computer interaction field has attracted the most attention, and there have been many studies on human gesture recognition. A gesture is an effective nonverbal communication tool that helps in complex human interactions with its ability for simple communication. Hand gesture recognition is applied to many fields from a sign language system for the hearing impaired to smart devices for effective interactions. Various gesture recognition approaches that involve hand region detection, hand feature extraction, and learning and recognition methods have been reported.



0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP



Abstract

This paper illustrates the hand detection and tracking method that operates in real time on depth data. To detect a hand region, we propose the classifier that combines a boosting and a cascade structure. The classifier uses the features of depth-difference at the stage of detection as well as learning. The features of each candidate segment are to be computed by subtracting the averages of depth values of subblocks from the central depth value of the segment. The features are selectively employed according to their discriminating power when constructing the classifier. To predict a hand region in a successive frame, a seed point in the next frame is to be determined.

Thank You