MINI PROJECT

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CSE(19)

Object Following Robot

Object Following Robot

- The Object Following Robot is a Tracking Robot
- The aim of this robot is to search for a particular object for which it is programmed and then follow it endlessly.
- The property that differentiates this with other robots is that beside basic robotic principles different methods for processing, analyzing, and understanding are used. All these methods produce information that is translated into decisions for the robot. From start to capture images and to the final decision of the robot, a wide range of technologies and algorithms are used.

Robotic Vision

- The field of Robotic vision guidance is developing rapidly. The benefits of sophisticated vision technology include savings, improved quality, reliability, safety and productivity.
- A Robotic vision system makes distinction between objects. These machines duplicate the abilities of the human eye using programming code and electronic parts
- These systems are used in many fields like industries and robotic services for identification or navigation and are continuously improving with new features like 3D support, filtering, or detection of light intensity applied to an object.

Uses OF Robotic Vision

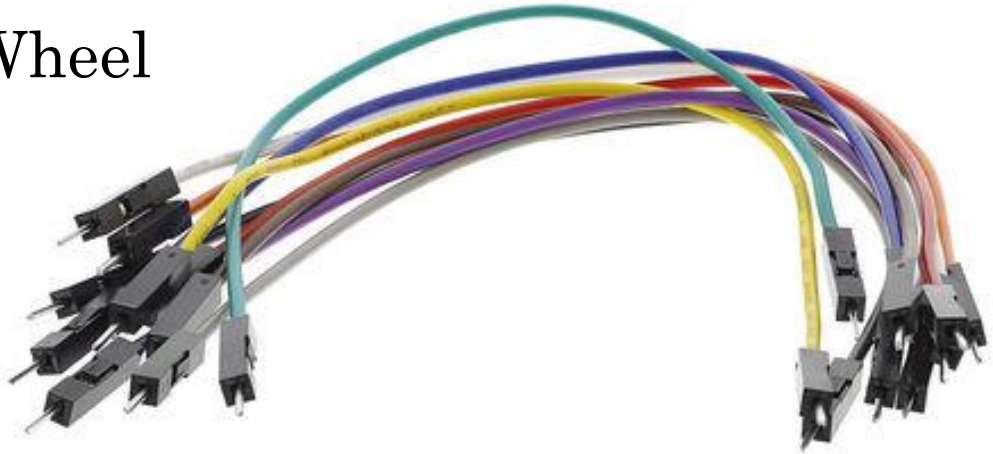
- Object Detection;
- Applications for security and surveillance.
- For computer-human interaction.
- Defense applications
- Used in inspection to remove/replace defective parts
- Used by autonomous vehicle or mobile robots for navigation
- Medical applications
- Scientific Explorations

Technologies Used

- Image Processing Tool: MATLAB
- Movement Mechanism: Differential Drive mechanism
- Development Board: Arduino UNO
- Motor Driver IC: L293D

Tools Used

- One Camera
- USB cable
- 12V DC/100 rpm motors
- Jumper Wires
- 9 V Battery
- Chassis
- Castor Wheel



Screen Shots

HOME SCREEN (MATLAB)

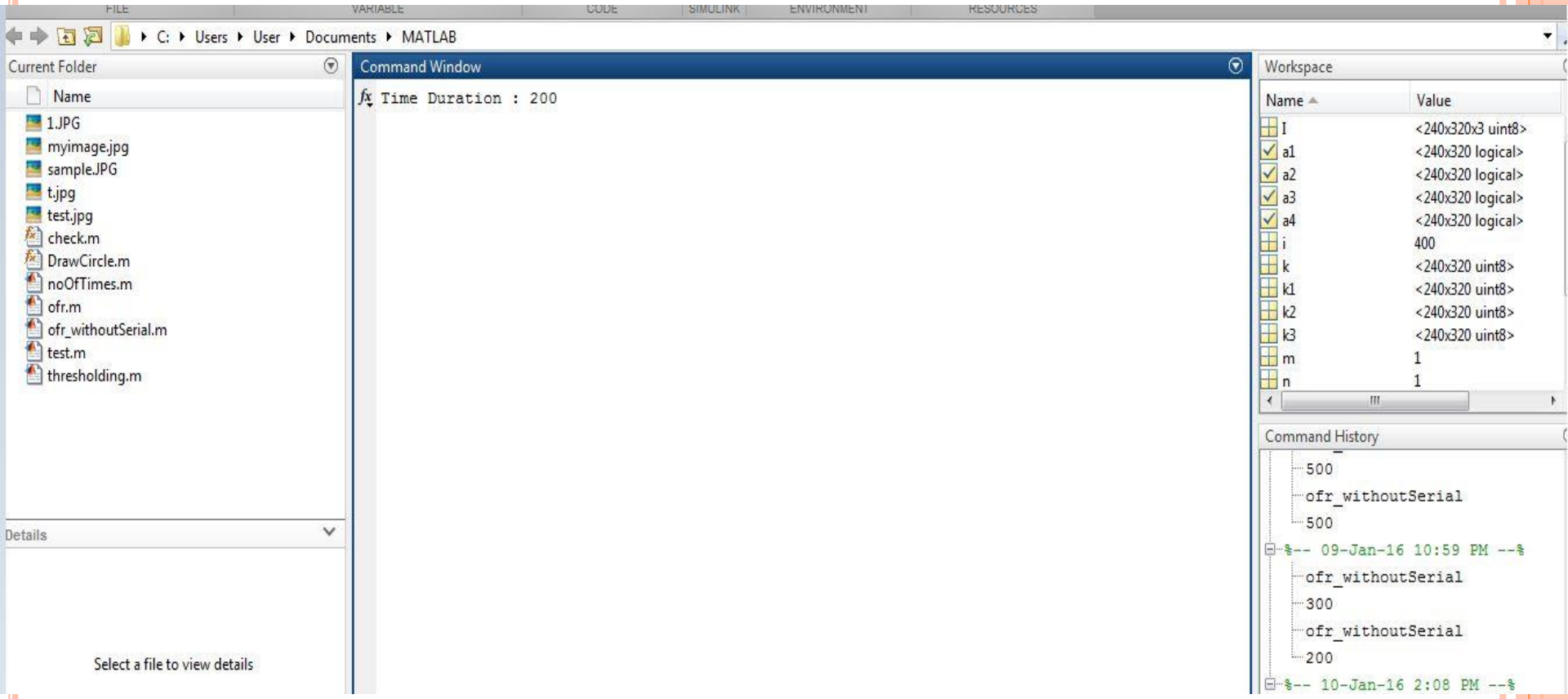
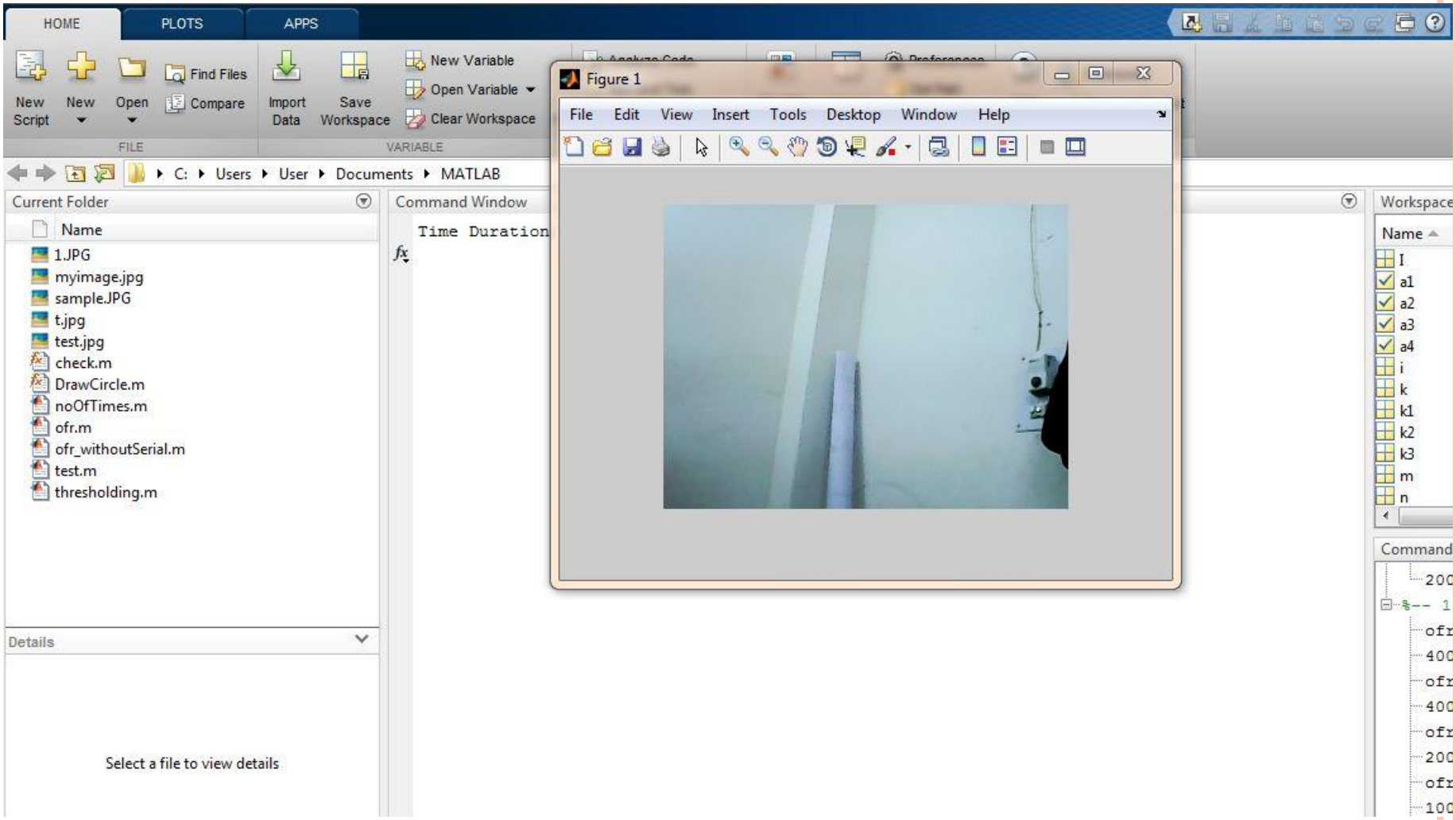
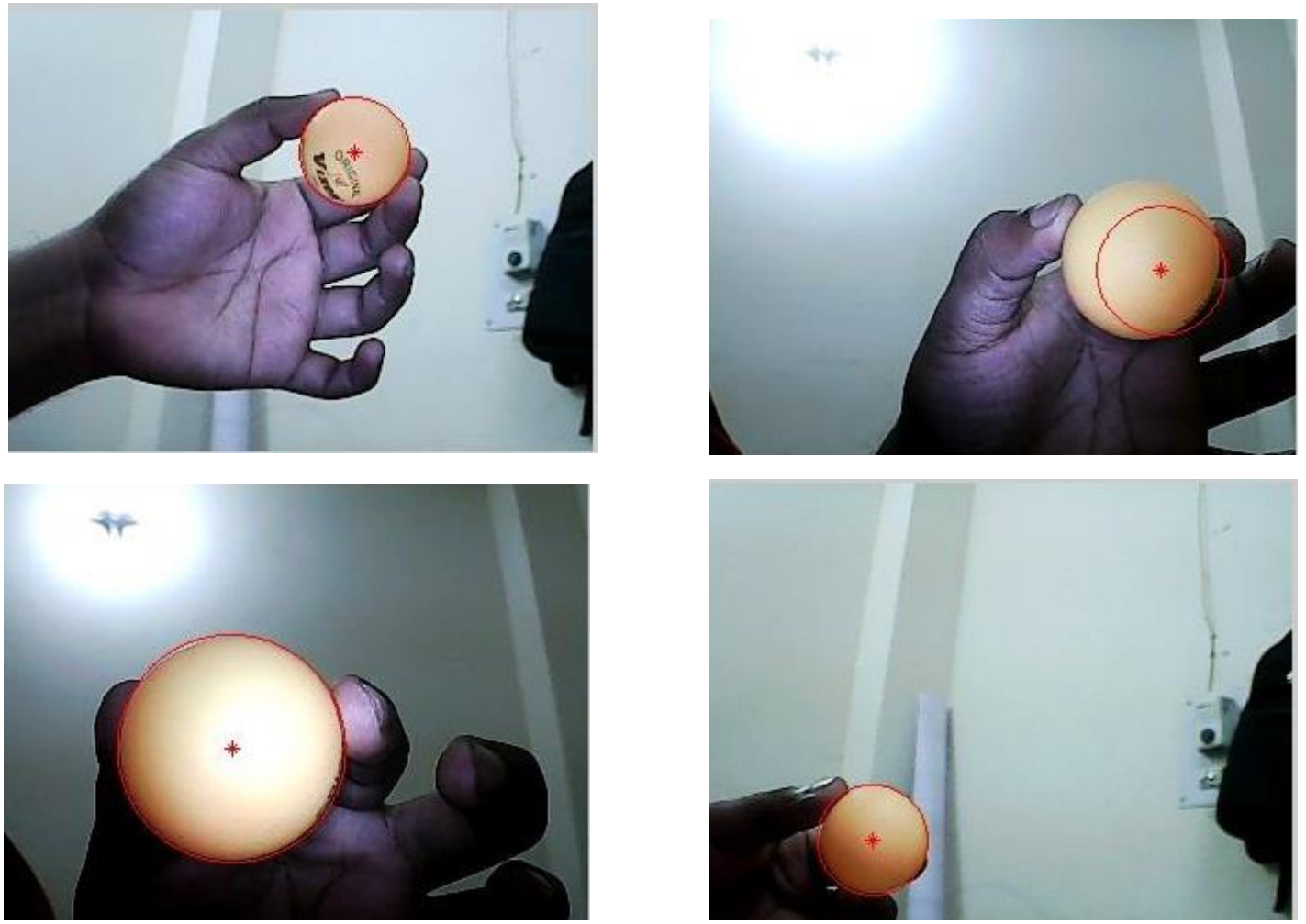


Fig: Matlab Screen: Here time for which the bot should follow is Entered

Output Screen



Once the time is entered in the previous screen a video loop starts which shows the video the bot uses to identify Object.



- Snapshot of BOT detecting programmed object.

Basic Mechanism

- The Bot first isolates the object from the video by comparing its RGB values.
- Once the object is isolated its centroid is located and radius of the smallest circle enclosing it is found
- The centroid of the object gives the bot the idea whether the object is towards left or right
- Similarly by analyzing the radii the bot can estimate if the object is far from it or close to it
- By using the above information the bot sends appropriate commands so that object is within the specified parameters.

Future plans

- Further implementation of image processing algorithms to detect object under extreme conditions.
- A fully fledged tracking system creation.
- Improvement in hardware so that movement of bot can cope up with its image processing capabilities.
- Use of better filtering algorithms so that objects can be isolated easily

References

- Alper Yilmaz, Omar Javed, and Mubarak Shah. Object tracking
- COMANICIU, D., RAMESH, V., AND MEER, P. 2003. Kernel-based object tracking.
- YU, S. X. AND SHI, J. 2004. Segmentation given partial grouping constraints.
- BALLARD, D. AND BROWN, C. 1982. Computer Vision. Prentice-Hall.

Thank you!!