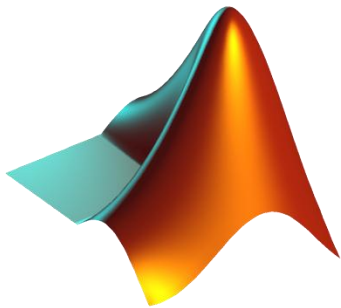


# Design and Implementation of an Intelligent Animal Intrusion Detection System for Farm Protection from Wild Animals using Internet of Things



**MATLAB EXPO 2018**

**Mr. J. ARUN PANDIAN. M.E., (PhD)**

Assistant Professor,

Computer Science and Engineering,

M.A.M. College of Engineering and Technology,

Trichy, Tamil Nadu, India.

aparunpandian@gmail.com

# Brief Introduction

- Higher Demand in Food Production
- People and Animal Conflicts
- Harmful for the Animals
- Destruction of Crops and Farm Infrastructure
- Wireless sensor Networks
- Internet of Things

# Problem statement

- Loss of Human Life and Injury to Human Beings
- Harmful for Animals
- Needs,
  - Sensing
  - Reporting
  - Preliminary Prevention Actions
  - Automated Manner
  - More Cost Effective



# Crop Damages



Animal causing the damage	Crop damaged	Percentage crop damage
Wild Boar	Cereals (maize, wheat, oats, Barley)	46.48
	Vineyards	13.71
	Durum wheat	13.84
	Hazelnuts	12.92
	Grassland	11.62
	Sunflower	8.62
	Chestnuts	3.26
Monkeys, Porcupine, Goral, Deer, Bear	Maize	38.90
	Potato	29.60
	Millet	18.60
	Wheat	6.70
	Paddy	3.80
	Pulses	0.23

Wild animal	Crops	Percentage crop damage
Elephant	Coconut, plantain, paddy	72
Gaur	Mulberry, sandal	62
Sambar	White sapota	17
Wild boar	Tapioca, tubers, paddy	16

Italy and Nepal

Kerala (India)

# Issues and Challenges

- **Issues:**

- Scare-Crow, Hellikites, Balloons, Flyers, Shot/Gas guns, String & stone, etc.
- Nylon nets and Fencing

- **Challenges:**

- Animal classification, detection and tracking their positions.
- Sensors and Cameras.

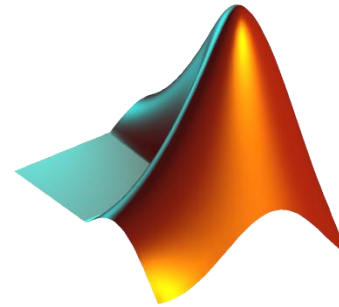


# Approach

- Internet of Things
- Sensing:- Detection of entry of the animal in the crop field
- Communicating and taking preliminary actions
- Divert Animals
- Maintaining ecological balance

# Tools used

- Matlab 2016b
- Raspberry Pi b+
- Arduino Uno
- PIR Sensor
- Ultrasonic Sensor
- Wi-fi Shield for Arduino
- Camera

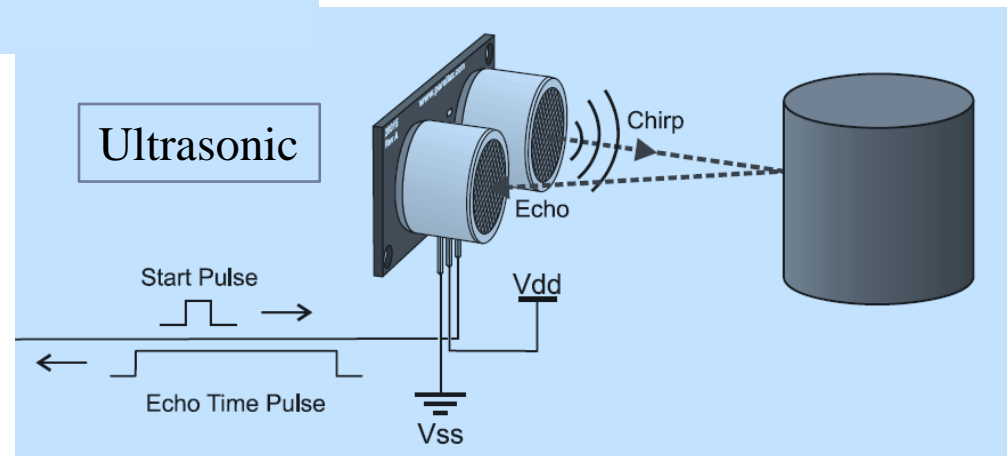
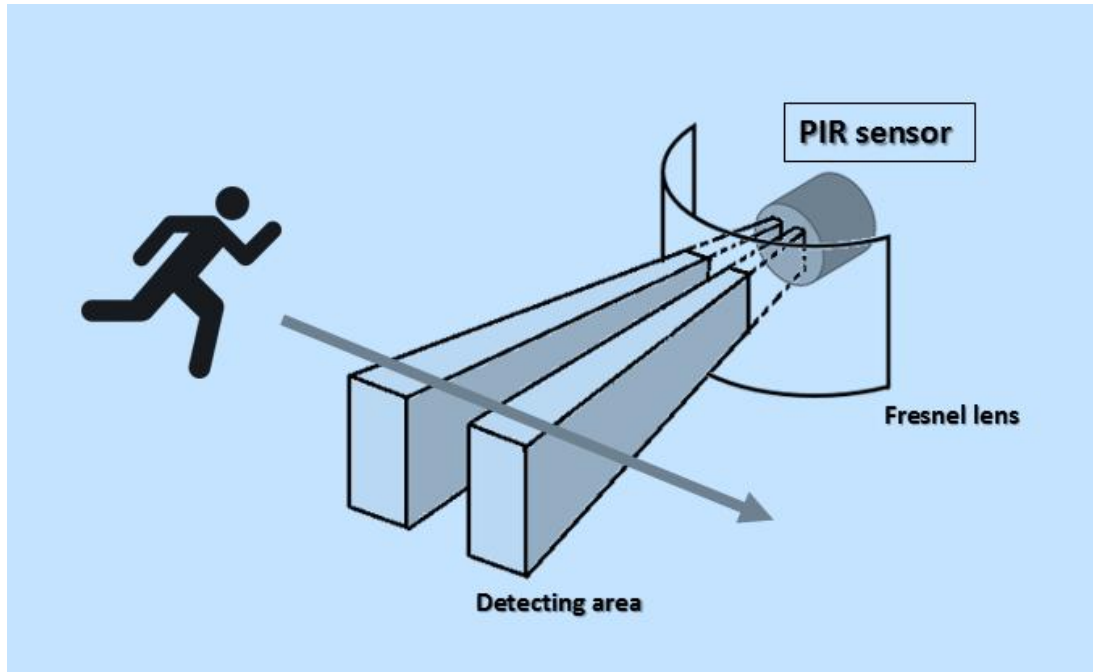


RaspberryPi

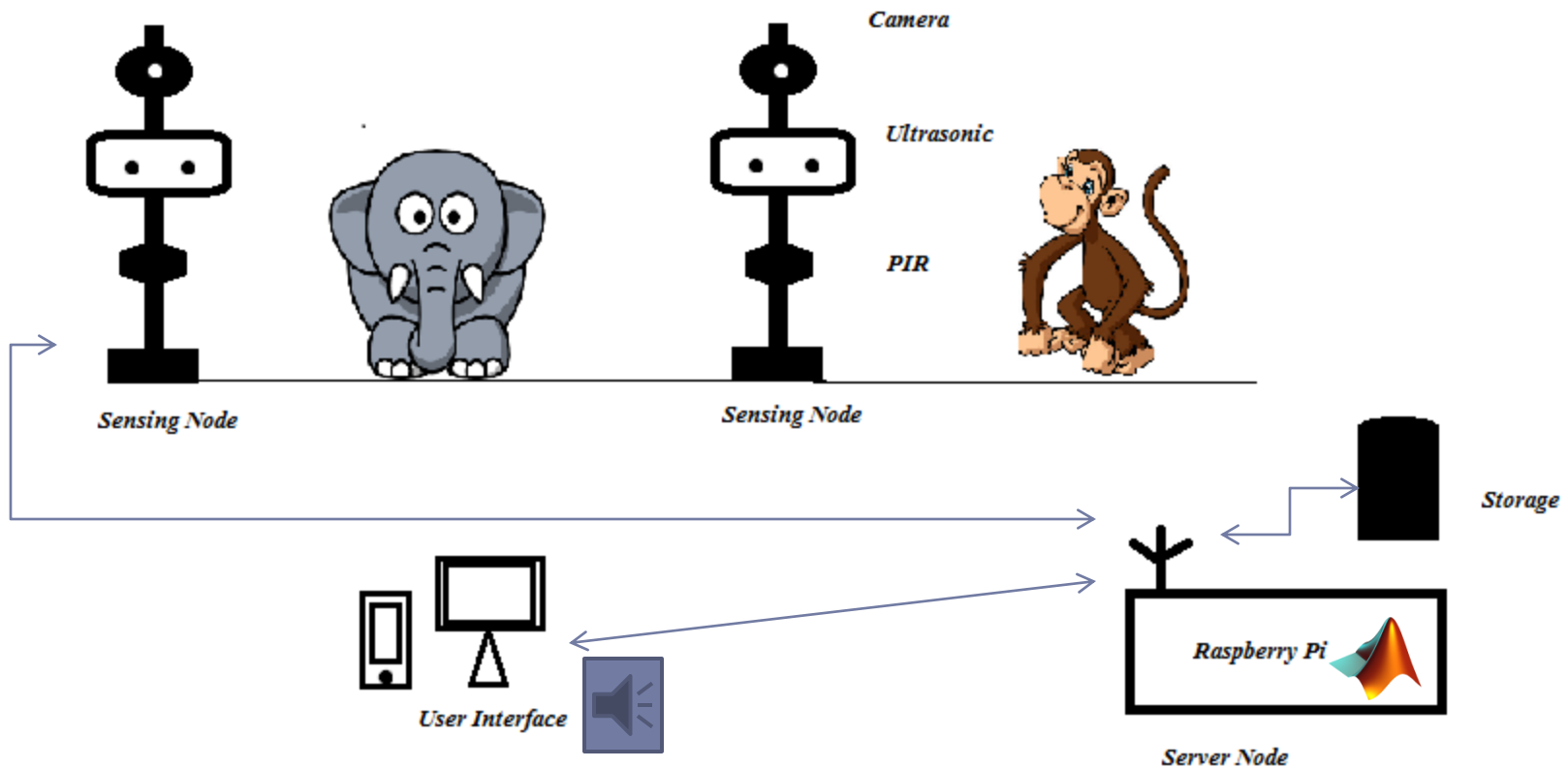
# Experimental Setup

- Sensing Unit
  - Passive infrared Sensor (PIR)
  - Ultrasonic Sensor
- Control Unit
  - Monitoring
  - Primary action tacking
  - Send notifications to caretaker
- User Interface
- Recording Unit
  - Camera
  - Database

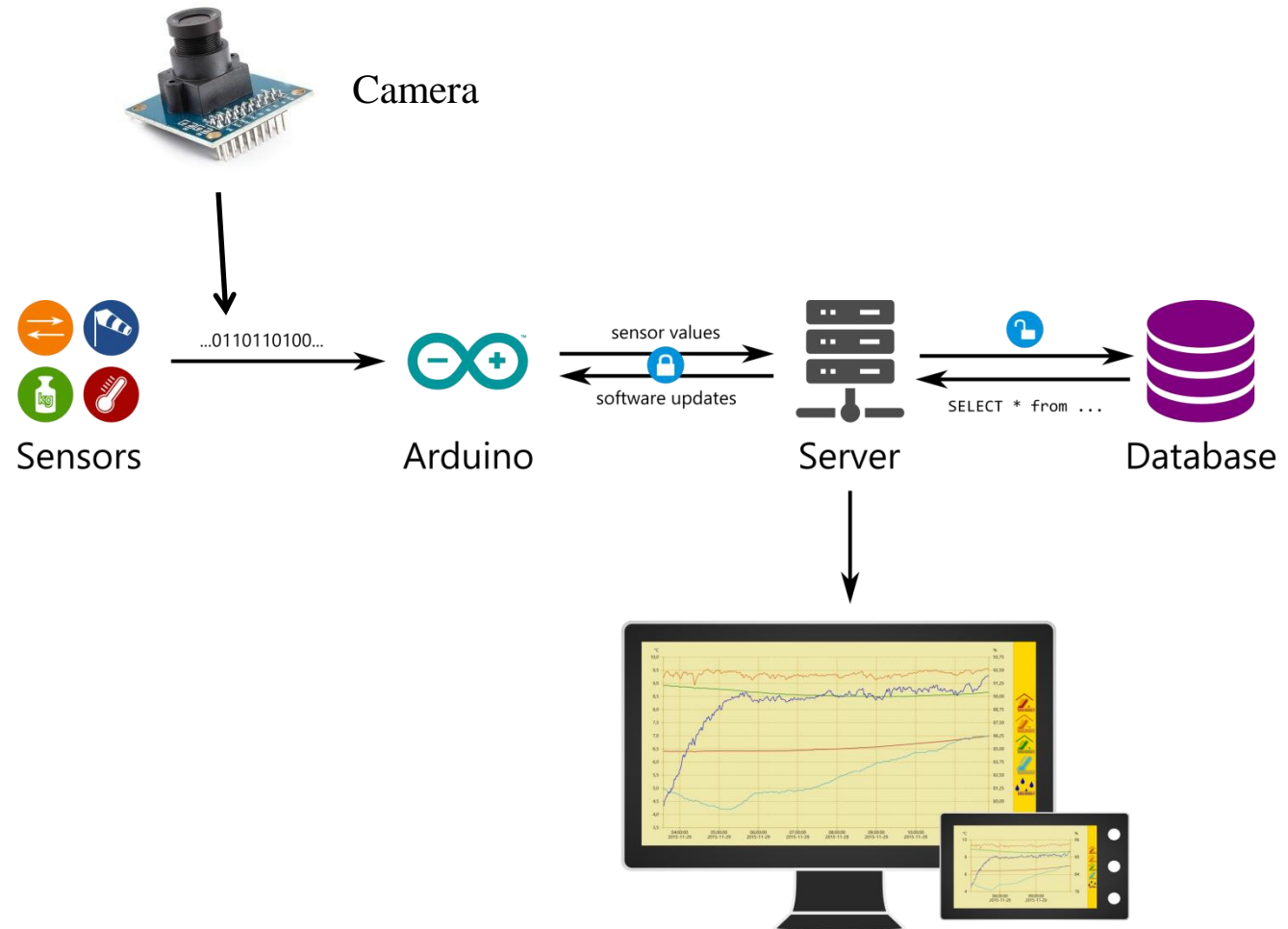
# Sensors



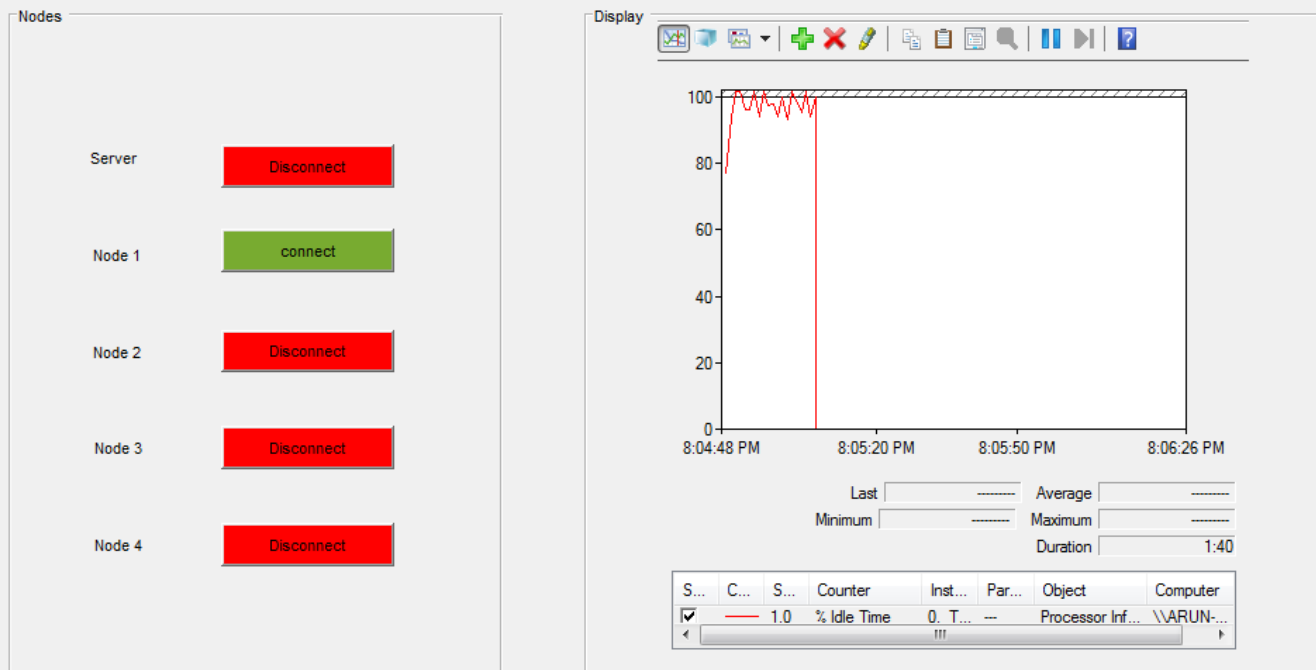
# Control



# Record



# User Interface



# Features

- Cost effective
- Robustness
- Reliable
- Easily adaptable by the farmers
- Remote Monitor
- Low energy consumption

# Result

- Implemented the prototype in Trichy (Tamil Nada, India)
- Powered by solar power source
- More than 92% accuracy
- Less Implementation Cost
- Predicted monkeys and goats
- Recorded the status using cameras

# Conclusion

- Field tested the prototype at Trichy (Tamil Nadu, India).
- Installed easily and cost effective
- Ecological balance
- Less power requirement
- Solar panel based charging unit is provided
- Audio signal patterns
- Alert message

# References

- Amici, Andrea, Serrani, Fioravante, Rossi, Carlo Maria, Primi, Riccardo, 2012. Increase in crop damage caused by wild boar (*Sus scrofa* L.): the “refuge effect”. *Agron. Sustain. Dev.* 32, 683–692.
- Awathi, B., Singh, N.B., 2015. Status of human-wildlife conflict and assessment of crop damage by wild animals in Gaurishankar conservation area, Nepal. *J. Inst. Sci. Technol.* 20 (1), 107–111.
- Bishop-Hurley, G.J., Swain, D.L., Anderson, D.M., Sikka, P., Crossman, C., Corke, P., 2007. Virtual fencing applications: implementing and testing an automated cxcattle control system. *Comp. Electron. Agric.* 56, 14–22.
- Felemban, Emad, 2013. Advanced border intrusion detection and surveillance using wireless sensor network technology. *Int. J. Commun., Netw. Syst. Sci.* 6, 251– 259.
- Foster, A., Rosenzweig, M., Behrman, J., 2000. Population Income and Forest Growth: Management of Village Common Land in India. Brown University.
- Garcia-Sanchez, Antonio-Javier et al., 2010. Wireless sensor network deployment for monitoring wildlife passages. *Sensors* (August), 7236–7262. ISSN 1424- 8220.
- Garcia-Sanchez, Antonio-Javier, Garcia-Sanchez, Felipe, Garcia-Haro, Joan, 2011. Wireless sensor network deployment for integrating video-surveillance and data-monitoring in precision agriculture over distributed crops. *Comp. Electron. Agric.* 75 (2), 288–303.
- Human-Wildlife conflict: the issues <[www.fao.org](http://www.fao.org)>.

# Thank You



# MAMCET

M.A.M. COLLEGE OF ENGINEERING AND TECHNOLOGY