JIZTOM KAVALAKKATT FRANCIS

PH D CANDIDATE

✉ jiztom@iastate.edu

🌐 jiztom.github.io/Jiztom.html

📞 (515)-708-4467

📍 Dept. of Agricultural & Bio-Systems Engineering
Iowa State University,
2326 Elings Hall
Ames, IA - 50010

f jiztom

🐦 jiztom

in jiztom

⛓ slezoric

Skills

SCRIPTS & PROGRAMMING LANGUAGE

Python

C / C++

MATLAB

PyTorch

Java

OpenCV

C#

APPLICATION SOFTWARE

LabVIEW

Blender 3D

Unity

CANoe

Qt

EBGuide

CVAT

OPERATING SYSTEMS

Windows API

Linux Distros

Contiki

ROS

Kali Linux

HARDWARE PLATFORM

Arduino

Raspberry Pi

ARM Cortex

Embedded CAN module

Nvidia Jetson

PROTOCOLS

ISO 15118

CAN Bus 11898

802.1x

Bluetooth

Education

Iowa State University, Ames, IA USA *Fall 2017 to Current*
PhD Computer Engineering
Master of Science Computer Engineering 2019
Research focus on Machine Vision and Machine Learning on Real World Applications. GPA 3.93/4.0

Loyola ICAM College of Engineering and Technology *June 2013 to May 2017*
Bachelors of Engineering Electronics and Communication Engineering 2017
Final Project on ISO 15118 Car charging station protocol. CGPA - 7.6/10

Employment

Iowa State University - Agricultural Bio-systems Engineering Ames, IA
Digital Ag Graduate Research Assistant - Machine Vision/ Machine Learning Jan. 2021 to Current
- **Project:** Multivariable regression using Deep Learning, Seed Object Detection, Insect Classification using sound, SQL Pipeline maintenance.
- **Research:** Impact of additional data layers to images to improve open-world detection of objects and patterns.
- **Paper:** Pattern-Based Multivariable Regression using Deep Leaning (PBMR-DL), Deep Learning, and Pattern-based Methodology for Multivariable Sensor Data Regression
- Funded Innovation project to classify insect sounds based on their sound characteristics.
- Automate Data extraction for furrow vision project and create machine learning models for predicting Residue based on Images.
- Written custom automation and pipeline for data loaders and data pre-processing to SQL Servers.
- Actively working on researching Image segmentation and object detection techniques.

Engineer Designer II / Engineer I - Digital Ag Ames, IA
  Jan. 2020 to Current
- **Projects:** CAN-based GPS Tagger, CAN-based Third-party Implement integrator, Satellite-Based Farming Prediction, Code first SQL Data Integration, Camera Image Acquisition App
- Programming and Implementing MRS Embedded Modules for Off-road vehicular CAN-based controller for specialized Research products.
- Scripting custom process automation code for Data analytics and SQL Uploads with Backup protocols.
- Setting up and providing in-house support for VM-based products and file transfers with ext4 file format support.
- Designed a custom Android App for more efficient documentation in Image capture for Project records.
- Embedded solutions to improve data collection capability in the research of the Agricultural Bio-systems Domain.
- MATLAB-based automation for visualizing and processing Satellite Imagery data to predict crop production and growth loss using NDVI.

Graduate Research Assistant - Digital Ag Ames,IA
  Jan. 2019 to Dec. 2019
- **Projects:** Sensing Objects in Multiple Terrain, Advanced Machinery Data logger Units
- Implementing vision systems and mapping tools to achieve the required goals for the research group using tools such as MATLAB and LabVIEW.
- Sort out the Technological Challenges the Agricultural segment face and find ways to solve and improve overall efficiency.
- Working on supporting Linux-based data logging systems at the hardware level.
- Program Embedded products to suit the required client and internal needs of the research group.

GE Appliances Lafayette, GA
Fall 2018 AME Co-Op Aug. 2018 to Dec. 2018
- **Projects:** On-Line Camera Test System, Embedded Inventory control label
- Controls and Test Co-op Engineer in the Advanced Manufacture Engineering group.
- Prototype new test modules or procedures to improve manufacturing efficiency using python and proprietary software codes.
- Maintain and rectify the test sequence for new builds.
- Create a custom part tracker for the electronics flashing stations to backtrack uploaded software and inventory.

Iowa State University - Dept of Electrical and Computer Engineering Ames, Iowa, USA
Graduate Research Assistant - IoT May 2018 to Aug. 2018, Jan. 2019 to Dec. 2019
- **Project:** Long Range Irrigation Monitoring System
- **Research:** Long Range Low Power IoT devices data collection and power analysis.
- Research Assistant in the Internet of Things (IoT) Research Group developing a Wireless Sensor Network for Precision Agricultural Domain. (Smart Farming)
- Design custom data logger with wireless capability at a generic level. Using Python at the high-level post-processing and C++ at the firmware level.
- Enable future technologies to include temporary storage and additional sensor option for the specific farming application.

Hochschule Heilbronn (University of Heilbronn), Germany Heilbronn, Baden-Württemberg, Germany
Senior Design Project Intern Feb. 2017 to Mar. 2017
- **Research:** ISO15118 Protocols and deployment for car charging stations.
- Developed Display driver for ISO15118-based Car Charging Station written in C case structure.
- Led a three-member team, with a specific focus on back-end drivers for the display unit.

JIZTOM KAVALAKKATT FRANCIS
PH D CANDIDATE

Projects

Fall 2021 to Spring 2022	**Deep Learning and Pattern-based Methodology for Multivariable Sensor Data Regression**

- **Requirement:** Prove a faster approach to solving regression using lower computation requirements while increasing the accuracy of sensor fusion.
- Using historic Crop data to predict future crop yield based on data about the weather during the entire season.
- Proved that 2D numerical data can be used with large-scale unique data for pattern detection.
- Proposed multiple applications to simplify regression using advanced pattern detection techniques.

Spring 2021 to Current	**Residue Prediction - Machine Learning Modelling**

- **Requirement:** Isolate residue and compute residue percentage based on imagery.
- Automate data extraction to generate images to produce an in-house dataset.
- Isolate images to which ground truth for labeling. Use labeled data to create machine learning models for predicting residue.
- Verify new techniques of data processing and see if additional vehicular data can improve prediction results.

Jan. 2019 to Feb. 2020	**Stubble Height Detection for Sugar Cane - Automation**

- **Requirement:** Design and develop a tool to measure and adjust the cutting blade for sugar cane harvester.
- Custom algorithm to get the required live stubble height based on LIDAR line scan data.
- Provide feedback to the system to get the blades adjusted to obtain the maximum yield.
- Procured data and provide proof of concept to the client by field testing.

Jan. 2020 to Current	**Data Pipeline - SQL uploader - Automation**

- **Requirement:** Process incoming client data over FTP and upload it into the SQL Server at set intervals with customized solutions
- Using C# with Entity framework for Code First Database model to upload filtered data into SQL Server.
- Combined multi-code platforms to utilize string manipulation capability with SQL integration capability of C# to improve multithreaded performance.
- Process and prevent duplicate of incoming client Flat Files uploads and provide efficient archive directory architecture for easier SQL query data.

Fall 2021 to Spring 2021	**Y drop Estimation - Machine Vision - Automation**

- **Requirement:** Design a custom Machine Vision software to isolate prongs for distance detection
- Isolate color bands using HSV Spectrum to detect prongs on running sprayers. Isolating effects of sunlight and moving vibrations
- Populate the detected prong distance based on calibrated data to on-site field testing.

Paper Publications

Cloud-based multi-sensor remote data acquisition system for precision agriculture (CSR-DAQ) · Master's Thesis   Spring 2018 to Fall 2019

- **Requirement:** Design a cost-effective and accurate data logger for IoT-based information gathering and prediction for the horticulture department.
- Developed the prototype Data logger at stage 4 with a power management cycle perfected to run an entire crop season.
- The end product allows a layman to visualize and measure data of the field as a part of Smart Farming.

Pattern Based Multivariable Regression using deep Learning (PBMR-DL) · CVPR 2022 - https://arxiv.org/abs/2202.13541   Fall 2021 to Current

We propose a deep learning methodology for multivariate regression that is based on pattern recognition that triggers fast learning over sensor data. We used a conversion of sensors-to-image which enables us to take advantage of Computer Vision architectures and training processes. In addition to this data preparation methodology, we explore the use of state-of-the-art architectures to generate regression outputs to predict agricultural crop continuous yield information. Finally, we compare with some of the top models reported in MLCAS2021. We found that using a straightforward training process, we were able to accomplish an MAE of 4.394, RMSE of 5.945, and R^2 of 0.861.

Hackathons

HackISU Fall 17 · MLH Hackathon   Fall 2017
Ames, Iowa, USA

- **Problem:** Use machine vision tools provided to solve real-world problems.
- **Prize:** First place in innovation using Image-based self-adjusting machine automation
- A 36 hour no sleep hackathon to learn, explore, and develop new ideas based on challenges presented by the sponsor companies.
- Completed the Image perception and detection challenge and won a desktop 3D printer as the challenge prize.
- Created a video-based self-stabilizing hardware system based on QR codes and video input streams. This can be used to replace wire-based sensors for testing hardware.

HackISU Spring 18 · MLH Hackathon   Spring 2018
Ames, Iowa, USA

- **Problem:** Solve Augmented Reality Project.
- A self-learning challenge to solve an unknown problem using the skills learned during the event.
- Using Real Engine and VR tools to project Augmented reality applications on everyday objects.
- Learn new programming languages and tools to apply solutions to see how it works.
- Created an application to show physical objects with reactive buttons and gravity to teach actions and automation via Augmented Reality.