

INTERNSHIP OFFER – Gesture classification using ultrasound data

Company Overview:

Founded in 2003, InvenSense Inc., a TDK Group Company, is the world's leading provider of MEMS sensor platforms. InvenSense's vision of Sensing Everything[™] targets the consumer electronics and industrial markets with integrated Motion and Sound solutions. Our solutions combine MEMS (micro electrical mechanical systems) sensors, such as accelerometers, gyroscopes, compasses, and microphones with proprietary algorithms and firmware that intelligently process, synthesize, and calibrate the output of sensors, maximizing performance and accuracy. InvenSense's motion tracking, audio and location platforms, and services can be found in many of the world's largest and most iconic brands including smartphones, tablets, wearables, drones, gaming devices, internet of things, automotive products, and remote controls for smart TVs.

InvenSense is headquartered in San Jose, CA and has offices in Boston, China, Taiwan, Korea, Japan, France, Canada, Slovakia, and Italy. We're looking for top-notch students to join our global intern team. If you're interested in being a part of our journey and helping us grow to become the leading provider of SoC platform solutions, we definitely want to hear from you.

We are looking for motivated students to join our 2023 Intern Program! Our intern program includes real work assignments, Intern Appreciation Day (interacting with CEO and VPs), Networking Lunch with hiring managers, technical talks, New Hire Panel with recent grads, play with technology, off-site fun events, and more!

Internship Proposal :

Gesture classification using ultrasound data

Detailed description of the internship:

Many everyday objects become "smarter" by embedded microcontrollers that can perform certain classification tasks based on sensor information. The TDK high precision sensors are widely used for high performance applications such as present in smartphones, internet of things, home robots, drone control, virtual reality. Human friendly interaction is important in such cases.

TDK is the leader of MEMS Ultrasound sensors. The CH-x01 Ultrasonic sensors provide high accuracy

range estimate and signal varies on reflected material. Goal of this internship is the creation of a simple

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MEMS Sensor Business Group Sensor System Business Group 22 Avenue du Doyen Louis Weil 38000 GRENOBLE +33 438 211 931 www.invensense.com gesture classification interface using range and amplitude information from 2 ultrasound sensors. Real world constraints such as variation user to user, distance, gesture execution speed, environmental noise will be studied. In terms of classifier TDK R&D team has experience with several approaches from simple state machine up to temporal neural networks. The intern will be guided to choose the most promising classifier architecture, define data acquisition protocol and annotation, train the classifier from this annotated data, port the classifier to the target in C or python, produce a live demo for real time experimentation. Using part of the annotated data (test data), the intern will evaluate predicted performance of the classifier. In summary, this internship makes the intern familiar with all essential steps of the conception and deployment of a classifier in a customer product.

Tasks:

- Learning: get familiar with ultrasound sensor hardware.
- Learning: get familiar with existing in-house machine learning methods.
- Characterization: database collection and annotation.
- Implementation: prototype solution using Python or C.
- Evaluation: classification accuracy, false alarm rate, memory consumption, response latency. Describe limitations of the method.
- Demo: real-time gesture classifier using ultrasound sensors of a selected application.

Required skills :

Programming in C/Matlab/Python. Good knowledge of signal processing and machine learning methods. Desire for running experiments with sensor prototypes. Pragmatic mindset, autonomy and creativity are paramount skills for this challenging problem.

Contract : Professional Internship Qualification required : Bac+5 program Dates : To be defined Duration : 6 months Where : Grenoble

Thank you to send your curriculum vitae via email and cover letter to: <u>Daniela.Hall@tdk.com</u> and <u>Joe.Youssef@tdk.com</u>

Internship supervisor: Daniela Hall

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