Graduation projects:

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Send e-mail with title (Graduation Project-CHS) with your CVs and the project you are interested in if you would like to apply for a project. In the email, send me why you are interested in this project and why your team should be selected. The projects are technically sponsored by *TechiBees Inc*. It is a startup working in areas of Artificial Intelligence and Embedded systems. I will help the teams in finding funding for the equipment required to finish the projects. Throughout the year, students will learn other non-technical issues like presentation skills, writing reports, and project management.

Kids tracking

Identifying people can help in many applications and tracking them can help in many applications. One application is tracking kids in crowded areas. For example, in a mall, kids usually play around and they can lose contact to their parents.

The objective of this project is to develop a system that uses cameras installed in different places in a certain building (e.g. a mall) to track the kids from the time they enter this place until they leave. A video of the kid can be transferred to his parents and an alarm can be send to his parents if the kid left the safe area. This should be done in real time with no delay

This project will involve the following tasks:

1- Installing cameras in a certain area in a way to fully cover the place
2- Reading the video streams from the cameras
3- Processing the stream to detect the number of people in the video scene
4- Identifying the kids in the scene
5- Tracking the kids in every camera view and determining their places [this involves people recognition and tracking]
6- Sending a video stream to the parents
7- Sending an alarm if the kid left the safe zone

Tools: video processing, camera interfacing, Android programming, GPU programming, machine learning, databases, networking

A "very" smart meter

Smart meters that measure the electricity consumption and sends this usage to the electricity company, and maybe receiving some instructions from the electricity company, have been in production for sometime now. In this project, we would like to implement a smart meter with an advanced feature called NILM

https://en.wikipedia.org/wiki/Nonintrusive_load_monitoring

The main idea of NILM is to allow the determination of the electricity consumption of the individual devices. For example, it can "estimate", using machine learning techniques, the consumption generated by air condition, the heater, the fans, … etc. Moreover, it will be connected

to a database and it will estimate the cost of the bill using the current electricity prices. If the prices are changed, the meter will update its equation for calculating the cost. Other advanced features can be added if these features can be done like comparing the consumption of the apartment to other similar apartments, giving advices on how to save energy, .. etc. Although the topic is relatively new, some companies have been established in this area.

Tools: Machine learning, networking, embedded systems, board design, web development

Smart Droplet v3.0

We have developed a node called Droplet two years ago that can replace the access points at homes. The main difference between our Droplet and the normal access point is "programmability". Users can easily interact with this Droplet. The Droplet is based on Raspberry Pi platform. To show its capabilities, we have developed a mobile application that can interact with the Droplet at home. The user, when he is outside his home, can choose a video to download from youtube or other sites. The user , through the mobile app, sends the web link to the Droplet at home. The Droplet downloads the video until the user comes back home, then the user can watch it either on his laptop, mobile or tablet through a wireless local network. This is an implementation to what's currently called video caching. This reduces the buffering time when users watch the videos when they return back home, and this also reduces the load on the network.

Last year the students developed a distrusted social network based on the Droplet. Each user hosts his/her data on his personal Droplet. In the famous social networks, like facebook, the data is stored in servers owned and managed by the company itself. Facebook and other technology giants usually get many revenue streams from selling the customers' data to advertisers, which puts the privacy of the customer at risk. The students have also developed some other applications for the Droplet

In this year, it is required to develop more advanced features for the Droplet. We have a list of features to add to the Droplet. This includes automatic backup for the Droplet data to the cloud, adding a security layer, backup from a Droplet to other Droplets and more features.

Tools required: python programming, networking, embedded systems, dealing with Cloud and interfacing