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Security Implementation in banks using Lidar sensor A 3D modeling of the actual scenario

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***Abstract*—This is about implementation of lidar sensor which is used for 3d scanning in banks to improve the security of the bank. Usually lidar sensors are used in vehicles for detecting obstacles and objects nearby and also used in iphones for accurate augmented reality purpose. Our intention is to use this same technology for security purpose and we've come up with an idea of using this technology in bank in case of hijack or robery this technology can help cops and investigation officers to make the next move with more knowledge.**

Keywords—security; banks; lidarsensor; 3d scanning;

I. INTRODUCTION

LIDAR, which stands for Light Detection and Ranging, is a surveying method that measures distance to a target by illuminating the target with laser light and measuring the reflected light with a sensor. While LIDAR is used in a variety of fields ranging from construction to disaster response, it is critical for autonomous vehicles and robots as it helps them to sense the world around them. However, a long-standing problem with LiDAR has been its size — remember large spinning LiDAR sensors fitted on top of vehicles.

But not anymore! Voyant Photonics, a New York-based company, has created a LiDAR system which is as small as a mini chip, and can practically fit on your fingertip. The company claims that the tiny size has reduced the manufacturing cost by "more than 10 times" and has also brought "semiconductor scaling to 3D sensing"..

II. SMART AND COST EFFECTIVE

For self-driving cars to become a reality through commercial viability, automakers will have to equip vehicles with sensing technologies that can plan a path through a virtual map. In a way, LiDAR is fundamental to autonomous vehicles as it provides 3D high-resolution information about the external environment.

Not only can LiDAR spot the position of people and objects near the vehicle, it can further assess the speed at which they are moving. Voyant Photonics' creation holds great significance because even the most compact LiDAR solutions still have the size issue and the ones that are ready to be fitted in vehicles are larger than a hand.

III. SIZE MATTERS

In such a scenario, a LiDAR of the size of a chip can be easily installed in multiple corners of a vehicle (even inside the cabin) and can provide valuable data on the position of people and objects around it.

Further, even if the "10 times cheaper" claim by the company is partially true, it means that the exhoribitant cost of manufacturing autonomous vehicles will get substantially lower — since LiDAR system is an essential part of such vehicles. "This is an enabling technology because it's so small," Voyant Co-Founder Steven Miller was quoted as saying. "We're talking cubic centimeter volumes. There's a lot of electronics that can't accommodate a lidar the size of a softball — think about drones and things that are weight-sensitive, or robotics, where it needs to be on the tip of its arm," he added.

IV. WHAT IS LIDAR SENSOR ACTUALLY

LIDAR systems are mostly bulky and expensive. High-end models cost thousands of dollars, and even the smallest new systems are considerable in size. Since the sensor is mechanical, spinning around constantly, it is large. The large size of the LiDAR limits the refresh rate of the image. A solution to the size issue may be on the cards as researchers from MIT and DARPA are working on a new version that shrinks the light-bouncing apparatus onto a chip that's smaller than a grain of rice. It is a LiDAR sensor that fits onto one 300 millimeter microchip.

LiDAR chip is a silicon photonics that uses silicon waveguides to create "wires for light," with properties similar to optical fibers except on a much smaller scale. These waveguides are integrated into on-chip photonic circuits. An electronic analogy to silicon photonics would be something like taking discrete electrical components and integrating them onto a microchip.

These chips could be manufactured using the same process used for microprocessors, which will bring down the cost of production considerably. Not only does this new approach mean that the sensors will be much cheaper — they'll cost about $10 each to produce.

V. WORKING OF LIDAR

In simple terms, LiDAR emits laser light at an object and calculates the time it takes to return to the receiver. The laser source fires rapid pulses of light at a surface and a sensor measures the amount of time it takes for each pulse to scatter back. This process is repeated in quick intervals to build a complex map of the object. The distance between the static system and the target object can be calculated at high accuracy using the formula given below

The distance of the target object = (Time of Flight x Speed of Light) / 2

In mobile LiDAR, as the sensor is moving, the data from GPS and IMU such as height, location, and orientation of the instrument is critical. The data are downloaded and processed using application-specific computer software. Geographically registered longitude (X), latitude (Y) and elevation (Z) for every data point is calculated to create detailed topographic maps

VI. HOW TO IMPLEMENT THIS TECHNOLOGY IN BANKS

Usually banks used to have a emergency button which informs the police control room that something is wrong over there. Now, we are going to enhance the efficiency of this functionality using Lidar Sensors. Usually Lidar sensors are used to scan something and make a 3d model of it. When there is a hijack in bank the emergency button will be pressed and the lidar sensor placed all over the bank will start capturing everything in 3d and send the data to the police control room so that the police can get enough details of what are the weapons they have and even with the 3d modeling of the attacker they can match against their record to find the real identity of the attacker. Due to the cost efficiency of the lidar sensor we can place multiple sensors all over the bank so that a clear 3d image of the room can be taken. This same technique can also be used in the flights also so that in case of flight hijack police can easily identify how many hijackers are there and what are the weapons they have and is there any explosives placed in the flight or not etc.. This technology should be implemented confidentially so that the hijackers will not be aware of it that they would think the security camera is the only thing that watches them so they will try to take them down, due to the small size of the lidar sensor no one can ever notice it.

VII. TECHNOLOGY AS A WEAPON

Technology is a powerful weapon which means that it can be used for both good and bad purpose depending on who is using it. For an instance this same technology can be used for robbing a place as well but the thing is we should be always thinking forward and we shoud be using the weapon first before the offenders use it. Using the weapon first alone will not get us win we should use it wisely likewise we should use the technology also wisely and with an efficient maner. Before implementing the lidar sensor we should make sure we have adequate system resource for capturing the entire structure in 3d and sending them to the police office. An extremely high speed wireless transmitting method must be implemented to transfer the captured data to the police control room.

VIII. THE CONCLUSION

Technology is evolving everyday but the thing is everything that depends on technology must also evolve in order to survive. Using a product only for what it is intended to be is not so cool , technology is the only thing that can be used more efficiently in every other way possible. This is just an idea of how technology can be used efficiently for some other works which is not what it intended to be used.

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