Hardware Security Education for All Through Seamless Extension of Existing Curricula

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Challenge:

- Undergraduate curriculum for EE/CE/CS majors does not provide exposure to **hardware security (HS)** fundamentals

- Elective/special topic courses on HS are taken by only a small fraction of the student population (e.g., students already interested in HS)

- Number of historically underrepresented students taking the course is even lower

- Leads to a shortage of cybersecurity workforce and researchers with HS background

Enrollment in HS Course vs a Core Design Course at KU
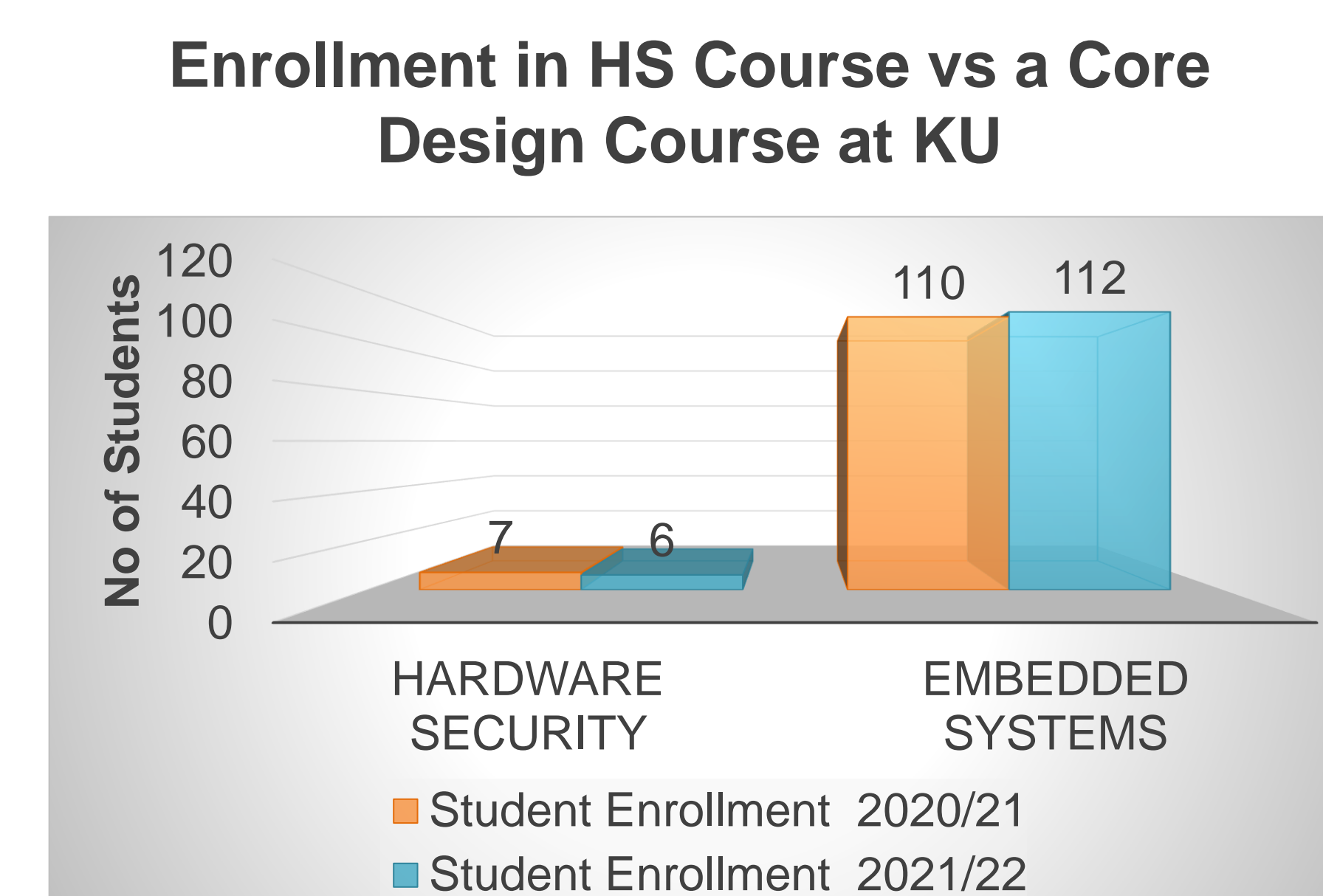
Approach:

- Facilitate *HS education for 'all'* EE/CE/CS UG students by incorporating the learning process within existing core courses

- Utilize the HS concepts as a tool to exercise the various modules in core design courses:

- Example: Design FSM for traffic light controller → Design FSM for watermarking/logic locking

- Plan to integrate six foundational HS concepts in core courses related to digital design and embedded systems and distribute the course modules to the broader community
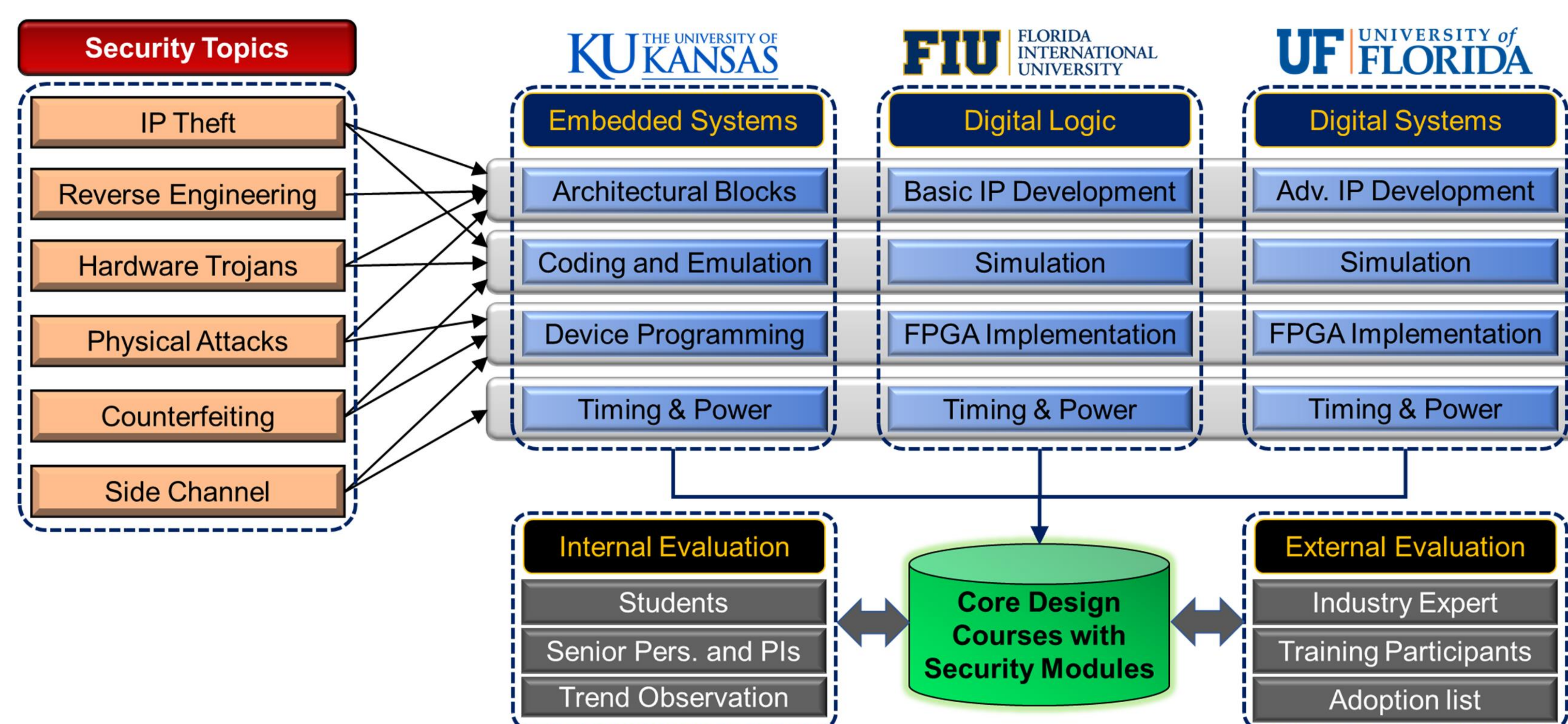
Scientific Impact:

- Creation of six HS modules for each of the three hardware-oriented core courses for organic and contextual learning

- Driving graduates from EE/CE/CS to pursue career/research in HS will create diverse perspectives on emerging HS problems

- HS expertise in cybersecurity workforce helps in developing novel system-level security solutions

- Creating new insight for seamlessly incorporating specialized topics into fundamental courses

Broader Impact:

- Broadening UG students' participation in HS field

- Amplifying the participation of underrepresented students in cybersecurity education and research

- Creating diversified cybersecurity workforce with HS background

- The course materials, instruction guidelines, and other outcomes will be shared through web portals, workshops, and special sessions

- Potential application to popularize other emerging topics of growing importance such as quantum computing